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United States Patent No.	80,878	August 11, 1868,
" "	131,788	October 1, 1872,
" "	132,416	" 22, 1872
" "	169,811	Nov. 9, 1875, and

whereas of late various Signalling Apparatus have been advertised or made, which are infringements of the above or of some or one of the above-mentioned United States Patents,

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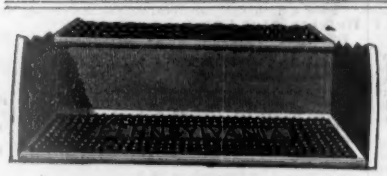

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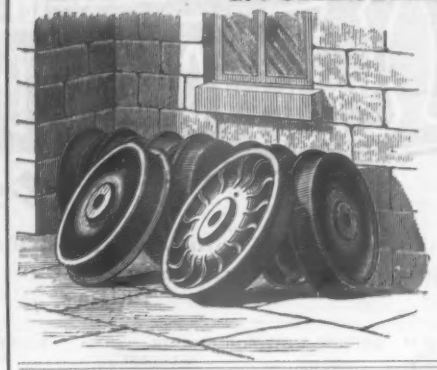

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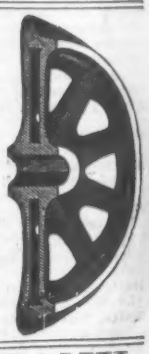

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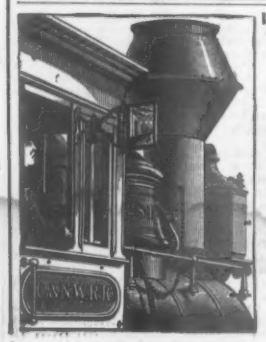

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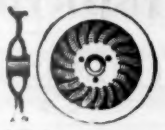
AND CHILLED  CAR WHEELS.

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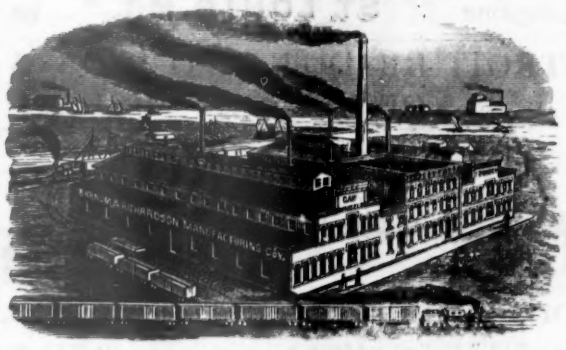

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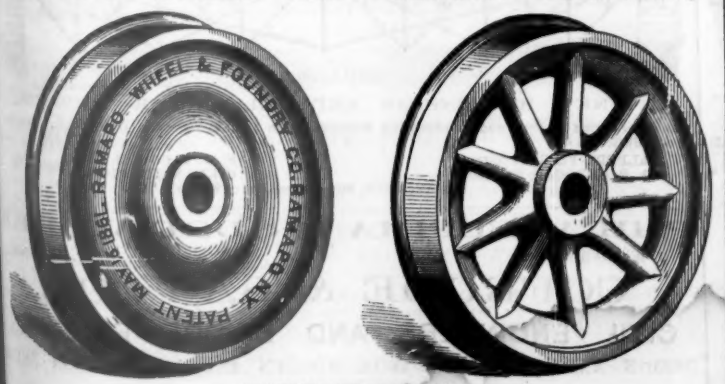

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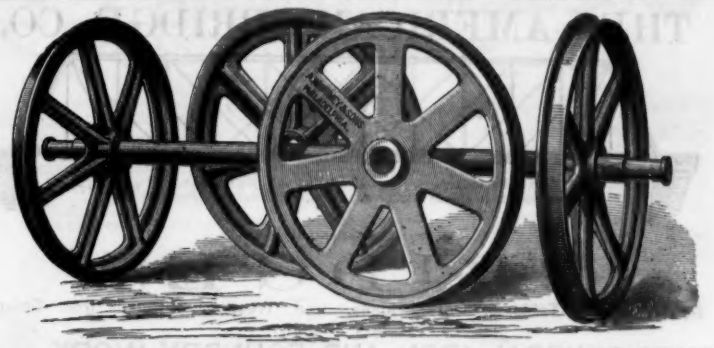

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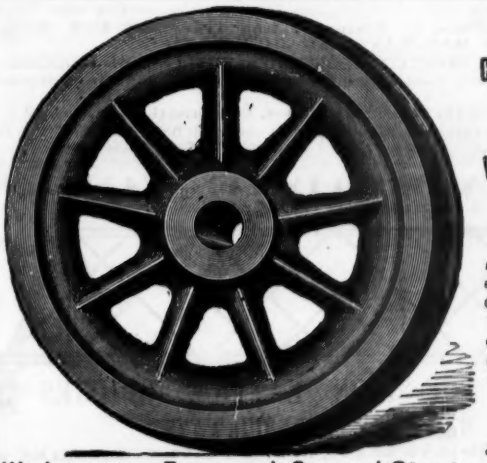

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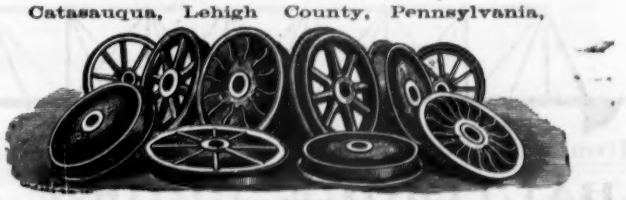

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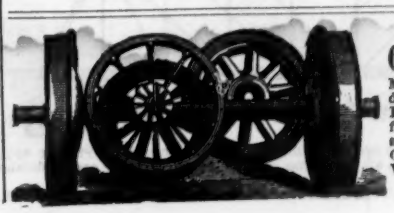

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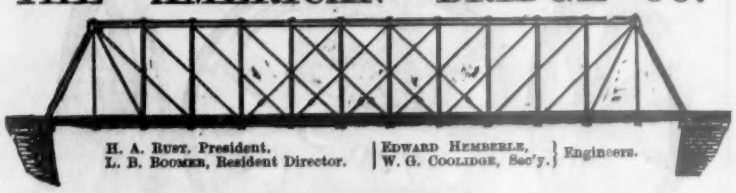

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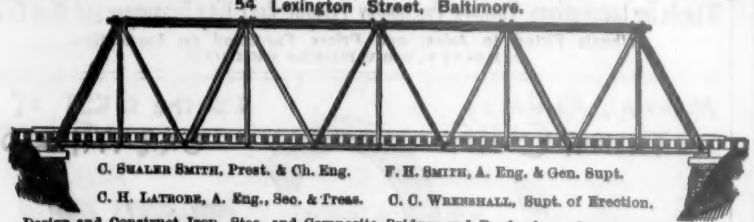

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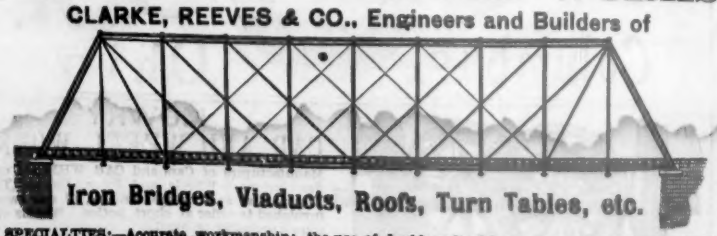

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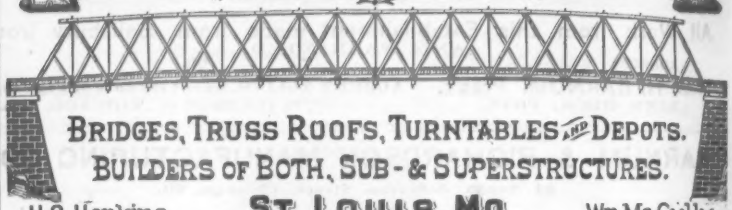

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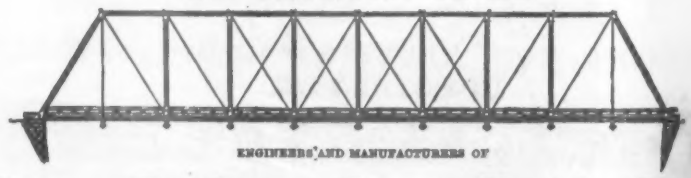

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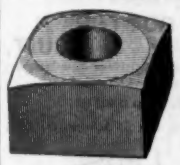

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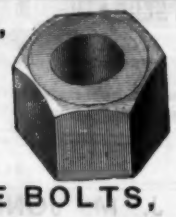

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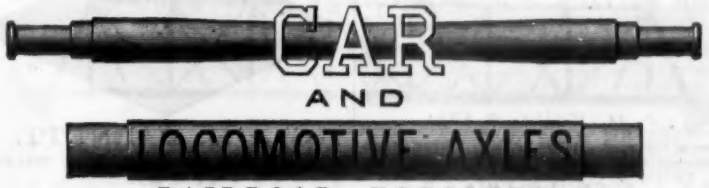

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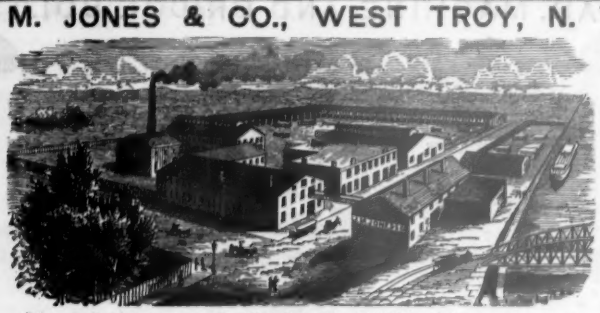

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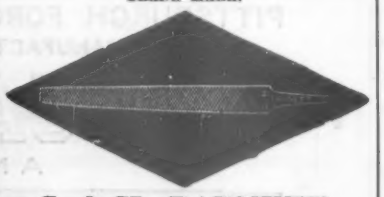

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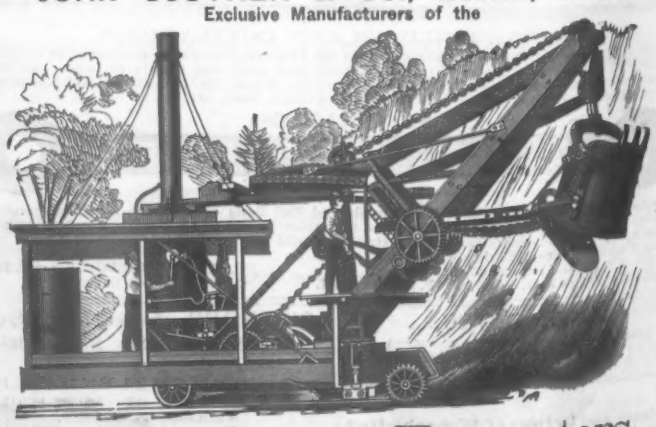

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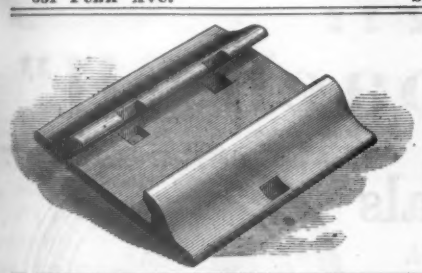

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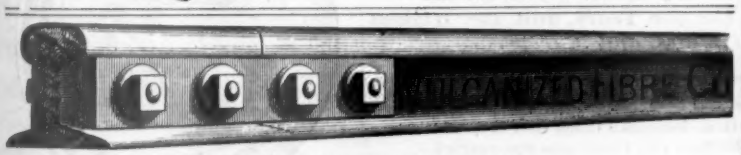

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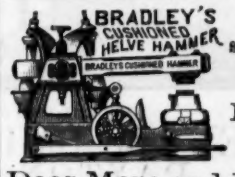

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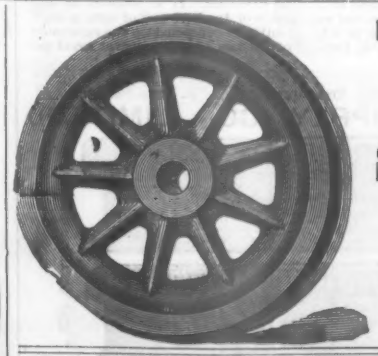

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RAILROAD GAZETTE

FRIDAY, JUNE 29, 1877.

MASTER MECHANICS' ASSOCIATION.

Tenth Annual Convention.

REPORT OF COMMITTEE ON THE BEST MATERIAL, FORM AND PROPORTION FOR LOCOMOTIVE BOILERS AND FIRE-BOXES.

At your last annual convention, held in the city of Philadelphia, May 16 and 17, 1876, we submitted to you a report embracing the above subjects, and the Association deemed it proper to continue the committee with one or two exceptions, requesting that we continue the investigation of these subjects and report to you the result.

Your committee issued a circular requesting information on the several subjects named therein, which was sent by the Secretary of your Association to all the superintendents of motive power and master mechanics in the United States and Canada. Yet we are sorry to report that, out of all that number, but seventeen, including the members of your committee, made any reply thereto.

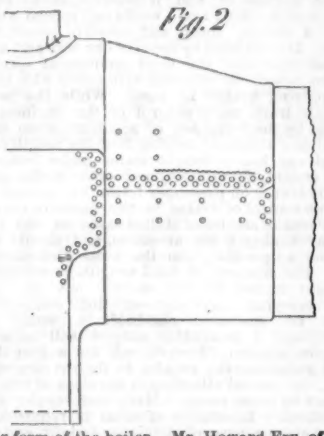
We do not deem it necessary to insert in this report the circular referred to, and therefore omit it, presenting the different subjects in regular order, the first being the

BEST MATERIAL FOR THE SHELL OF THE BOILER.

We find that on this subject there is scarcely any difference of opinion. With two exceptions all express themselves decidedly in favor of steel for the shell of the boiler. It is superior to iron in strength, and less difficult to shape and put together, and seems to be in every way preferable. Those who have used it most extensively for this purpose are the most decided in preferring it.

Not a single instance is reported where steel in the shell of a boiler has ruptured when cold, or in heating up, or from putting cold water in the boiler while hot, as so frequently occurs in the case of the sheets of the fire-box. Mr. Sedgley, of the Lake Shore & Michigan Southern, reports one steel sheet in the shell of the boiler to have cracked or broken in the way common to iron sheets in such cases, caused by imperfect con-

Fig. 2



struction or form of the boiler. Mr. Howard Fry, of the Philadelphia & Erie road, reports five steel sheets in the shell of boilers on that road to have cracked during the year 1876, but that in every case it was believed to be the result of bad workmanship or bad design in the form and bracing of the boiler, and not from the quality of the steel. These cracks are represented in Figs. 1, 2 and 3.

Your committee believe that the material in the shell of boilers should be heavier than that in general use; that a greater stiffness and surplus of strength would add greatly to the length of time that they can ordinarily be used with safety, and lessen the cost of keeping them in repair from year to year. As the elastic limit of steel such as used in boilers is not much, if any, above that of iron, the same thickness of steel should be adopted as in the case of iron, notwithstanding its superior toughness. It is important that boilers should be so formed and stayed that with the highest pressure carried no part of one will change its original shape in the least by reason of the pressure. A change of shape in one direction by pressure, and returning again to its original position when the pressure is released, will sooner or later result in a crack. The same is true when braces are attached in such a way that the sheet is drawn from its true position by the strains from the brace. In designing and constructing boilers, these matters should always receive the most careful attention.

Those who have had much experience, and have given the matter close attention, give it as their opinion that steel, being more compact than iron, is less liable to waste away from corrosion, and in that respect it is to be preferred. From the expressions made to your committee, we find that steel is rapidly taking the place of iron for the shell of the boiler.

BEST MATERIAL FOR FIRE-BOXES.

The fuel used in locomotives in the United States is mainly bituminous or a semi-bituminous coal, if we except those on roads in the vicinity of the anthracite coal region in Pennsylvania. This being the case, our inquiries were more particularly directed to determine the best material for fire-boxes in locomotives using bituminous or similar coals.

This subject was treated at considerable length in our report to the last annual convention, and all the information we have obtained since that time in our investigation tends to confirm the opinions and conclusions expressed in that report as to the best material for fire-boxes, and the causes that frequently result in unexpected failure of some of the sheets. In answer to our inquiries the opinion is almost unanimous that steel is the best material for the sheets of the fire-box, notwithstanding sheets occasionally fail from rupture. Iron was thoroughly tested before the introduction of steel, and the results, on the whole, were unsatisfactory. Copper was extensively used for a time, but it was found to be expensive and not free from defects, the principal being its liability to wear away and become dangerously thin at points in contact with the coal, and yet show no outward sign of being in that condition.

We believe that experience has shown steel to be the best material for fire-box sheets, all things considered, in the use of coal for fuel, presuming the steel to be of a suitable quality.

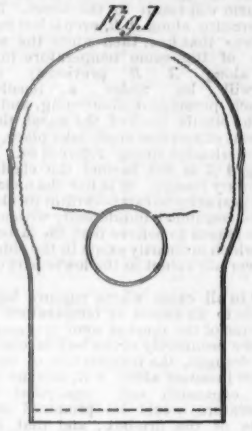
We find in many cases where steel has failed that it was not of proper quality for the purpose, being too hard and brittle.

It is not to be expected that steel or any other material in a fire-box will last indefinitely. If steel renders more service than any other material, for the same cost, then we may conclude that it is the best, yet it is important to know whether at present we are getting all the service from it that it is capable of rendering, and if not, how can we obtain more.

If it were not for the tendency of steel fire-box sheets to rupture suddenly and unexpectedly, we might consider that we had as perfect a metal as we could expect to produce at any reasonable cost, and not much more could be desired.

From the reports made to us we find that rupture of the sheets is still of frequent occurrence, ranging from 1 to 10 per cent. per year of the whole number of fire-box sheets in use, exclusive of the crown and tube sheets. In nearly all cases the rupture was sudden, yet the circumstances were in many cases quite different. Mr. James Sedgley, of the Lake Shore & Michigan Southern Railway, reports that in all cases reported by him

Fig. 1



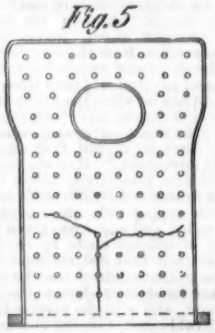
rupture occurred when the boilers were cold. The engines had made a previous mileage, the lowest 5,482, highest 229,233 miles, and the average was 100,369 miles. Mr. Chas. E. Peddle, of the Vandalia Line, reports that in all cases of ruptured sheets in engines on his line they were cold at the time, except one. In this case the boiler had been washed out, filled up with water and a fire started, and rupture occurred while heating up, and in both a side sheet and door sheet at the same time, as represented in Figs. 4 and 5. Of this case Mr. Peddle says: "The side sheet was of Hussey, Wells & Co.'s steel; cracked with a loud report, near the centre of the box; crack ran vertically from rivet in mud ring through eight stay bolts, as shown in Fig. 4, about 34 inches long." "At the same time that the side sheet cracked, the door sheet of Krupp steel

Fig. 3

ruptured; the crack, beginning at the mud ring, extended vertically through four stay-bolts, and branched to the left diagonally 10 in., and to the right horizontally through three stay-bolts and almost to a fourth in the row above, as shown in Fig. 5. As this was a remarkable case—a ten strike as it were—I send you a sketch of the two sheets. These sheets had been in use four years and one month and made a mileage of 107,412 miles."

One of your committee had a case where rupture occurred in the middle of a side sheet while the boiler was empty, and had

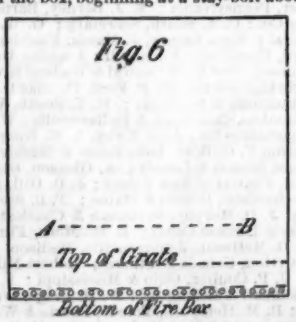
Fig. 5



been in that condition for ten days previously. It took place while a stay-bolt was being calked about two feet from where the crack started, making a loud report. The crack began at a stay-bolt about six inches above the grate, and extended downward to the mud ring and upward about three feet, in all forty inches long. The sheet had been in use four years, and had made a mileage of 120,000 miles, and was of crucible steel.

Mr. Jacob Johann, of the Toledo, Wabash & Western Railway, reports that one side sheet of Low Moor iron ruptured after a fire had been started in the engine. The boiler had been previously cleaned out, was filled up, and had stood 24 hours cold. The crack was vertical, and near the centre of the length of the box, beginning at a stay-bolt about six inches

Fig. 6



above the grate, and extending eleven inches. It had made a mileage of 164,378 miles.

James M. Boon, of the Pittsburgh, Fort Wayne & Chicago Railway, states that four steel sheets in the fire-boxes of the engines on his division ruptured during the past year. They were all side sheets, one in each of four engines, and cracked near the centre of the length of the fire-box; the direction of the crack in all three cases was vertical. The engines were standing in the house cold or cooling down at the time, after coming in from a trip over the road.

The sheets were all five-sixteenths thick, and the mileage previously made was 21,544; 69,650; 97,324, and 58,438 miles respectively. The instances given above are a fair sample of the circumstances under which fire-box sheets usually crack, as we learn from the details given in the various reports made to your committee. We find that where rupture occurs in the sheets of steel fire-boxes, the proportion of the different sheets that crack are about as follows: 37 side sheets, 3 door sheets, 2 tube sheets, and 1 crown sheet, and that in nearly every case the crack is vertical.

It will be noticed that where rupture occurs it is mainly in the side sheets, and not far from the centre of the length of the box, and the direction of the crack is invariably vertical; in a few cases, however, diagonal a part of the distance.

These facts accord with those obtained and presented in our last report, and we only refer to them again as confirming the statements made therein.

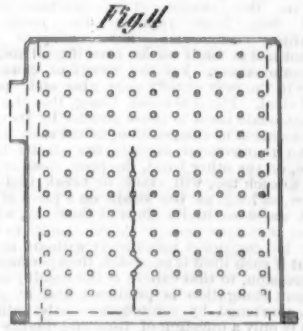
It is always safe to conclude that in matters such as that under consideration, nothing ever occurs without a cause. Then if we find that 37 side sheets crack, to 3 door sheets and 2 tube sheets, it would seem that there must be some cause operating on the side sheets that does not to so great an extent on the others, and that cause operates mainly in the one direction, tending to produce rupture in a vertical direction.

The opinion entertained by several prominent members of this association, that rupture is caused solely by inherent defects in the steel, does not seem to be a sufficient explanation. It is not reasonable to suppose that all or nearly all the defects in steel sheets are to be found in those used for the side sheets of the fire-box, and always at a point not far from the top of the fire, and that they are of such peculiarity as to cause the crack to take a vertical direction instead of horizontal.

As an explanation of the theory that rupture of the fire-box sheets results from inherent defects in the sheets themselves, we give some facts presented by Mr. James M. Boon, of the Pittsburgh, Fort Wayne & Chicago Railway in his report to your committee on this subject. Mr. Boon says:

"If side sheets crack from expansion, then channels ⅝ deep and extending vertically between stay-bolts would be an advantage. But I am not prepared to admit that the breakage of sheets is caused by expansion. My experience has been that the ruptures are caused more by some imperfection in the steel than from any other cause. A theory, to be sound, should hold good in all cases; but this theory of expansion does not. In the month of March, 1873, two new engines were put out of the shop and went into service the same day. Steel was re-

Fig. 4



ceived from manufacturers in one lot for both boilers. One of these fire-boxes has made 131,158 miles, and is to-day as perfect as when put in; the other fire-box cracked one side sheet (5/16 steel) after being in service three months. Two months after the other side sheet cracked, and continued to crack until a mileage of 85,637 miles was made, when the fire-box had to be replaced with a new one. Both engines were on the same kind of work, and using the same water. We have two fire-boxes made of ¼ in. steel. These fire-boxes have made a mileage, one of 333,120 miles, the other 325,171 miles, and not a crack or defect in them. Steel from same manufacturer as the two above mentioned. Two passenger engines built from same lot of steel (5/16 in. thick) went into service at one time on the same run. One fire-box was completely used up by cracking with mileage of 123,636 miles. This has been the case with all our steel fire-boxes. We have some that fractured one side sheet after a mileage of 32,000 miles, while the other sheet remains sound and in good condition with mileage of 137,139 miles. I do not understand why it is, if expansion is the trouble, one fire-box will give way and another remain good, or one side sheet be sound, the other fractured. As an experiment with some of the side sheets that cracked, I had the sheets cut off the full length of the sheet and as high as the crack extended (from 14 to 18 in. above grate bars), and a new piece of steel riveted on. These sheets have stood remarkably well. One has now been running two years. Now placing this seam the whole length of the sheet, riveted strongly, must have made a stiff place in the sheet, and the expansion must surely have placed this sheet on a more unequal strain than would have been with the single sheet. It should have broke or leaked. It did neither. Another thing which makes me think the trouble is in the steel: a sheet that is going to break will show defects before the fracture takes place. A sheet of steel that will bulge out or cushion between stay-bolts soon after the fire-box goes into service will give trouble. When this cushioning appears, you may as well get your patches ready, for you will need them soon. There have been cases when breakage occurred with no cushioning of sheets. In these instances the breakage has commenced on water side of the sheet, which will be full of minute cracks, which gradually enlarge until the sheet gives away. The fire side of the sheet will be smooth and free from cracks. Am of the opinion that scale on the sheets has little if anything to do with these failures. The fire-boxes that have given the most trouble were in service where the best water was. Have known crown sheets to have scale one-quarter of an inch thick on them and sag down in consequence. The bars were taken off, sheet cleaned and straightened back to original position without cracking or breaking in the least. From my experience with steel fire-boxes, extending over more than six years, I am fully convinced that nearly all the trouble from steel plates breaking is caused by some defect in the steel itself; and believe it will be overcome by manufacturers devoting more care and study to its production."

Your Committee believe that the explanation given in our report of last year as to the causes that sometimes result in rupture of the sheets in the manner, for instance, as that stated by Mr. Peddle, is correct. It is self-evident that at the time of rupture that part of the sheet is under tensile strain to a degree sufficient to pull it apart, and as a consequence the part of the sheet surrounding it must be under a strain of compression. Otherwise, tensile strain could not exist. It is also evident that these opposite strains in the sheet, did not exist when it was put in its place, new, in the box, as annealing effectually relieves any strain that might be produced by working it into shape. Then if no strain existed in the sheet when new, what has occurred to it to bring a part of it under a tensile strain sufficient to rupture that part, and how was this con-

dition brought about? We endeavored to explain our views on this point at considerable length in our last year's report, and do not deem it necessary to enter into any extended remarks in this, further than to call attention to a few facts that may have been overlooked.

Within the limits of the changing temperature of the sheets of a fire-box in its ordinary service, say from 50 degrees to 350 degrees, the expansion or contraction of the metal, will be in exact proportion to its temperature, if free to assume a length and size due to its temperature. At the same time the metal is elastic within certain limits. Now if all parts of a sheet are at the same temperature, all parts will expand alike, and no strain is produced in any part of it. This occurs in the case of crown sheets. All parts of the sheet being about the same distance from the fire, the temperature in all parts is about the same. If sediment collects on it it is about evenly distributed, and in that case if the sheet becomes hotter than it would if clean, it is hot all over alike, and no injurious strains will result by reason of unequal temperature. Of the several hundred sheets reported to us as having cracked, but one crown-sheet is reported. It was not stated under what circumstances it cracked.

Now, if expansion and contraction have nothing to do in producing the strains that result in rupture, as claimed by some, it is at least remarkable that defective sheets and a poor quality of steel are so rarely found in the crown of the fire-box, and as tube and door sheets. We find that the tube sheet of fire-boxes seldom cracks in the manner common to side sheets. Many roads do not report a single case of tube sheet having cracked within the past ten years. Other roads give the proportion as two tube sheets to 37 side sheets. This would indicate some other cause for this difference than simply a difference in the quality of the steel.

As previously stated, the proportion of door sheets that have cracked in proportion to side sheets is only about as 3 to 37.

Your committee are of the opinion that the causes that produce the strains resulting sometimes in rupturing the side sheets, are the same that in these rare cases, rupture tube and door sheets, and that the reason why these sheets so seldom crack compared with side sheets is on account of their proportions being such that the strain necessary to produce rupture can rarely be produced. These sheets being narrow, in most cases not more than 36 inches wide, for several feet above the grate, more readily accommodate their cooler edges (corners) to the influences of their hotter centres with less strain than would occur in the case of sheets longer in a horizontal direction, and as a consequence, injurious strains are seldom produced.

There can be no question as the quality of the steel having much to do with the matter of durability and its resistance to the forces tending to destroy it. A quality adapted to the requirements in the sheets of a fire-box will remain sound and free from rupture for years, when a poor quality, or one not adapted to such use, would not last as many weeks, even if used under precisely the same circumstances. Yet the forces or causes that produce rupture in the poor quality exist also and operate in the case of good steel. The difference being, that the good quality will accommodate itself to those strains by its elasticity, or permanent elogation or composition, as the case may be, if at any time the requirement exceeds the elastic limit of the metal; while, on the other hand, the poor steel, or the quality not adapted to such use, will crack or break under like conditions. Now, as long as the strain on a piece of metal does not approach too close to its limit of elasticity, whether it be of elongation or compression, no harm results to it, and such strains may be continued indefinitely without impairing its strength. But if such limit is exceeded, then permanent elongation or compression, to that extent, is the result; and if at one time permanent elongation is produced, and at another the same part is shortened by compression—alternating in direction—then it is only a question of time and quality of metal as to when breakage will occur. The metal best adapted to resist these destructive forces will last longest and that least so the shortest time.

Steel adapted to use in a spring will carry its load for years and still remain perfect and retain its elasticity, if not strained beyond its capacity. If the strain is beyond that point, then the leaves will either break or receive a permanent set, depending on the degree of hardness of the metal. This will occur, even if such strain is applied but a single time; and breakage under such circumstances would not in fairness be attributed to defects in the steel. It would be a remarkable fact, however, if the spring were to break or receive a permanent set without an excessive load or strain having been put on it; and it would be equally remarkable if fire-box sheets cracked or ruptured without being under excessive tensile strain. Tensile strain, then, in that part of the sheet, to an extent sufficient to rupture it, is the cause that produces the crack in every case where rupture is sudden. On this point we believe there is no room for a difference of opinion. It is also unquestionably the fact that a large number of sheets of the best quality of steel, so far as toughness and strength are concerned, have cracked in the same way, under the same circumstances as in cases where the metal was of an inferior quality. We find also that in a majority of cases, not more than one sheet of the fire-box has cracked, and that a side sheet. If more than one, then it is usually the other side sheet. It is pertinent then to answer the question that, if one side sheet cracks, why is it the other does not, although it may continue in use years after and still remain sound? Or if the sheets of one fire-box rupture, why do not those in another box of the same pattern, used under the same circumstances? If unequal temperature in different parts of the same sheet results in producing the forces that crack one of the sheets of a fire-box, why is it that the other sheet or sheets are not similarly affected from the same cause? We endeavored to give an explanation of this phenomenon in our last year's report, but as that may not have been sufficient, and our conclusions on this point being called in question by some of our members, we trust we may be pardoned if we follow to some extent the line of argument used on that occasion.

If, in the case of the spring referred to above, the load or strain upon it at no time exceeded the elastic limit of the steel, then no injury resulted from the strain, notwithstanding it may have been repeated for years. Another spring in every way like it, both in quality and hardness, and having been subjected to the same tests and usage as the first, will break or lose its set if the strain upon it exceeds the elastic limit of the metal, if it is only for one moment. In the same way, then, if the tensile strain in the metal in one sheet is greater than in the others, and such strain exceeds the elastic strength, then rupture occurs, or permanent elongation takes place in that part of the sheet. If rupture, it must necessarily be at right angles to the line of greatest strains. Are there any reasons, then, why the metal in a portion of one sheet might, under certain conditions, be under greater tensile strain than the metal in the corresponding part of the opposite sheet? If so, how was that state of affairs brought about? Fig. 6, representing a side sheet of a fire-box, will serve to illustrate how the forces referred to may be developed. The part of the sheet along the line *A B*, a few inches above the top of the grate, being the nearest to where the coal is undergoing combustion, will necessarily receive more heat per square inch than portions higher up, and particularly that below the top of the grate; and also the portions outside of *A* and *B*, in the corners of the fire-box. Now as metal expands in proportion to its temperature, this portion along *A B* will expand more in that direction than the portion of the sheet below the grate bars, and slightly more than the portion of the sheet in the upper part of the fire-box, if not prevented by those parts. While hot, then, the metal along *A B* is under compression in that direction. The extent of that compression will be in proportion to the difference between the temperature along *A B* and the portions of the sheet surrounding it; the greater the difference the greater the compression, and if the compression developed in this way exceeds the elastic limit of the metal, then the metal along that line is permanently shortened to that extent. But as long as the difference in temperature does not become great enough to produce a permanent shortening along *A B* no harm will result to the sheet. If, however, an excess of temperature along *A B*, even it but momentary, permanently shortens that line, then when the whole sheet becomes cold, or of the same temperature in all its parts, the portion along *A B* previously shortened by compression will be under a tensile strain to the extent of such permanent shortening, and if this tensile strain exceeds the elastic limit of the metal, then rupture occurs, or permanent elongation must take place, the same as in the case of the overloaded spring referred to. But if the tensile strain along *A B* is not beyond the elastic limit of the metal, then no injury results. It is like the metal in the spring loaded within its capacity to carry—within its elastic limit; and the strain may be continued indifferently without injury to the sheet. We have reason to believe that the latter condition described is that which ordinarily exists in the side sheets of fire-boxes, and to a certain extent in the lower part of the door and tube sheets.

We think that in all cases where rupture has occurred the cause is traceable to an excess of temperature in a comparatively small portion of the sheet at some previous time. By accident, or by some peculiarity of the bed of coals on the grate under a strong draught, the temperature of one sheet may at some point, as for instance along *A B*, become such as to produce unusual expansion and consequent results, while no such temperature would be produced in any part of the other sheets of the fire-box; and that such injurious temperature might, in the way described, be produced in several of the sheets in one engine, and in none at all in another engine. In every instance coming under the observation of your committee, where rupture occurred, it started from a stay-bolt hole, extending from that in opposite directions. The beginning of the final crack, we believe, was in each case an old crack extending from the stay-bolt, from one quarter to one and a half inches. These old cracks, doubtless, form a very small beginning, gradually increased in length by tensile strains in the sheet when cold, until the sheet had become too weak to withstand the strain, and when started, the jar or spring of the sheet, when rupture *began*, carried it far into the sheet beyond where any tensile strain existed sufficient to start a rupture. If, then, the causes referred to above are those which result in cracks at stay-bolts nearest the fire, and in some instances rupture of the sheet, it would seem that corrugations, or a few channels, vertical in direction, would to a great extent obviate the difficulty.

Mr. James Sedgley, of the Lake Shore & Michigan Southern Railway, has a number of fire-boxes in use with corrugated side sheets; the corrugations vertical and the stay-bolts situated in the top and bottom of the corrugations. In answer to the question as to whether any small cracks had manifested themselves at stay-bolts he states that they had, the same as in plain sheets. He also states that one corrugated sheet had cracked after being in use about one year, and that the crack was *horizontal* in direction, or at right angles to the corrugations, the only case ever reported to us in which a crack in a fire-box sheet started and continued in that direction. Mr. Charles Graham, of the Delaware, Lackawanna & Western Railroad, states that he has just taken out two corrugated iron fire-boxes which have been in use in the anthracite coal burning engines on that line, the one making a mileage of 183,240 miles, the other 210,000 miles. These boxes were of the long and comparatively shallow type, with a horizontal seam in the side sheets about half way between the grate and crown sheets. Of their condition he says: "There were a few small blisters on the fire side of the sheets, a few cracks from the rivets in the horizontal seam downward, resulting from the seam being too near the fire, a difficulty we do not encounter when the seams are high up." "I may mention that in these corrugated sheets there was an entire absence of small cracks from stay-bolts in the side sheets, while in the case of the crown sheet, a plain, straight sheet, numerous small cracks extended in every direction from the stay rivets caused by the washers between the sheet and crown bars being to large in diameter (2½ in.) and too thin (⅝ inch thick), and hard sediment filling up the space between the sheet and bars."

Mr. Graham also says that he has "one engine running with steel fire-box, one side sheet corrugated, the other plain, and another with both corrugated, but that neither has run long enough to show any advantage." Has one engine with corrugated side sheets of Low Moor iron, which has been in use seven years, made a mileage of 181,630 miles and is still in good order. Another with copper side sheets, plain, has made a mileage of 166,186 miles, and so far has given no trouble.

From the report of mileage made by steel fire-boxes, both last year and this, we infer that 300,000 miles for passenger engines and 250,000 for freight engines may be considered a very good average mileage for steel fire-boxes. Under favorable conditions it may be more, and with the reverse it will be less, depending to a considerable extent on the character of the water used, as to its purity and freedom from solid matter held in solution, with a tendency to adhere to the sheets in the form of a hard and solid scale.

(TO BE CONTINUED.)

MASTER CAR BUILDERS' ASSOCIATION.

Eleventh Annual Convention.

The convention assembled at the Kennard House, Cleveland, O., June 13, and was called to order by President Garey. The following members answered to their names when the roll was called: F. D. Adams, W. E. Chamberlain, Boston & Albany; David H. Baker, Pennsylvania; E. J. Barney, Barney & Smith Manufacturing Co.; C. A. Smith, Secretary; G. W. Demarest, Northern Central; Enos Varney, J. Marsh, Fitchburg; V. D. Perry, Hartford, Providence & Fishkill; Leander Garey, C. E. Garey, W. Johnson, New York Central & Hudson River; W. R. Davenport, Erie Car Works; M. P. Ford, Thomas D. Ferguson, Pittsburgh, Cincinnati & St. Louis; W. F. Smith, W. Cleaver, Cleveland, Columbus, Cincinnati & Indianapolis; Willis Davis, Empire Transportation Co.; John Kirby, A. M. Knapp, A. Merritt, A. C. Robson, F. O. Bray, Lake Shore & Michigan Southern; S. A. Davis, Boston & Lowell; A. Gleason, Old Colony; George Hackett, Central of New Jersey; J. B. Hill, M. Wilder, Erie; D. C. Richardson, Boston & Maine; T. B. Stewart, Connecticut Valley; J. D. Murphy, Savannah & Charleston; John Wilks, Delaware & Hudson Canal; R. B. More, Flint & Pere Marquette; J. D. McIlwain, Jeffersonville, Madison & Indianapolis; John Ortton, Canada Southern; Robert Miller, Michigan Central; J. P. Coulter, Ohio & Mississippi; S. S. Pilson, Louisville, Cincinnati & Lexington; W. H. Paige, Wason Manufacturing Co.; R. M. Hemphill, Toledo, Peoria & Warsaw; D. A. Hopkins, New Jersey & New York; George H. Pratt, Cleveland, Tuscarawas Valley & Wheeling; M. N. Forney, *Railroad Gazette*; John Hill, Lake Superior & Mississippi; J. W. Holmes, J. H. F. Wiers, S. F. Smith, Atlantic & Great Western; J. W. Marsden, New York & New England; Thomas Aylesbury, Kansas City, St. Joseph & Council Bluffs; Henry Childs, Great Western of Canada; G. W. Bitner, Pittsburgh Car Works; A. Steinbrunner, Cleveland & Pittsburgh; D. Sutherland, late Canada Southern; Henry Lange, New York.

Mr. ADAMS suggested that names of members ceasing to attend be dropped from the roll, but the Secretary showed that such action was not in accordance with the constitution.

A recess was taken to allow new members to sign the roll, the Secretary explaining the conditions.

President Garey then delivered his annual address as follows:

GENTLEMEN OF THE MASTER CAR BUILDERS' ASSOCIATION: There is much cause for rejoicing in this reunion. We have assembled in this beautiful city of Cleveland to celebrate our eleventh anniversary and to congratulate you upon the harmony, progress and usefulness of the association. But our rejoicing is not unmingled with sadness. Since our last annual meeting it has pleased Divine Providence to remove one of your officers by death. Mr. Aaron Steinbach, your worthy Treasurer, one who has been present at all the annual meetings during the life of the association, one who has acted with unquestionable integrity as our Treasurer for the past ten years, has been called home by our Heavenly Father.

The past year has been one of continual depression in business. The hoped-for improvements in all branches of trade have not been realized, and how to accomplish cheap and rapid transportation are still the paramount questions railroad managers are called upon to answer. How to transport the products of farms and manufactories from the producers to the consumers rapidly and cheaply, and at the same time pay a fair interest on the capital invested, has yet to be learned.

The traveling public demand all the safety, convenience and comfort attainable in the construction and maintenance of passenger cars. Now if a combination of all experiments and the results of progress connected with the working of railroads in the past were crystallized into reports, and placed on record for guidance in the onward march of improvements; if each delegate would present even one fact pertaining to the construction or repairs of cars proved by him during the past year, they could be placed on record for reference; and it is by exchanging experience and ideas, in open convention with full and free discussion, that each record can be made available.

The demand for improvement is constant and imperative. Practical knowledge, gained only by years of plodding experience, is valuable, but in this day is not sufficient.

Master car-builders should not merely do what comes to them every day, but endeavor to understand the subject in all its bearings, to find new and better ways of accomplishing the desired end, to learn from the views and experience of others, and to keep abreast of, and, if possible, ahead of the best achievements of the day; and I would call special attention to the want of a simple, cheap and effective power brake on freight cars. It is claimed by some of our best and most practical railroad men that the most economical speed to run freight trains cannot be attained with safety with the present system of applying brakes by hand. While the necessity of placing freight trains under control of the engineer has been demonstrated by the frequency of accidents (even at the low rate of speed now attained), arising from the length of time required to get our heavy freight trains under control by the hand power system, the economy and safety in the application of continuous brakes on passenger trains has proved the value of placing the control of trains in the hands of the engineer. The relative cost of service of chilled cast-iron and steel-tired car wheels is claiming much attention, and should be ascertained as soon as possible, also the most economical size for car wheels. The amount of dead weight as compared with paying weight moved by rail should not be lost sight of—if the carrying capacity of the ordinary freight car should be increased one-half it would be one step forward, and I trust this subject will have your attention ere you adjourn. I would ask for a free discussion of the rules governing the repairs to freight cars offered for interchange, and special attention to the class of repairs made to foreign cars by many roads. Many such repairs are made evidently without a knowledge of what is required. Badly repaired cars are the cause of detaining freight, and often the expense of transferring load, with detention of car at times for months, and in some cases even for years. The present system of interchange of freight cars carries to many shops cars from most of the roads in the United States and Canada for repairs. It has been stated that some of our shops have received cars for repairs owned by over 300 different companies, with about as many different styles of construction, which shows the necessity for more uniformity in those parts of cars which require the most frequent renewal, especially the axles, journals, journal-bearings and oil-boxes.

The social and business meetings held monthly during the several months from October to May of each year in the rooms of No. 113 Liberty street, New York city, have been interesting and profitable. We would recommend to any member who may have occasion to visit New York city during the months that such meetings are held to so time his visit that he may be able to attend the meetings. Thanking you for the many acts of kindness shown me—again I thank you for your attention while I have been making these few remarks.

It was then decided that the President should appoint the special committees.

The report of the Committee on Train Brakes for Freight Cars (already published) was then read and submitted for discussion.

Mr. DAVENPORT said that this was an important question in view of the increased speed of freight trains. The lines competing with water transportation found it necessary to run at greater speed and recently the Lake Shore & Michigan Southern had undertaken some experiments which seemed to show that freight trains can be moved more cheaply at 25 than at 12 miles an hour. If this speed is going to be adopted, some means of stopping a train quickly is very necessary and the question of train brakes becomes important.

Mr. FORD said that the conclusion of experiments mentioned was opposed to the generally received opinion and asked for more information. Fuel was a minor consideration, but repairs of track and equipment might be largely increased by the extra speed.

Mr. HOPKINS spoke of the importance of the question and further referred to the exposure undergone by freight brakemen with hand-brakes. He thought that at the higher speed there would be more destruction.

Mr. DAVENPORT said that in the experiments referred to they attached a dynamometer to the engine and kept a register from Buffalo to Chicago. They figured up the amount of work, in foot-pounds, required to haul the train at 12 and at 25 miles an hour, keeping track of all expenses, and the result was that the fast train was the cheapest. Less power was required to haul it. Another gain was that there was much less loss by radiation, the engine being under steam only half as long. This result had changed all his ideas, but he could not doubt its correctness.

Mr. FORD thought that at high speed there would be more destruction. The track would receive harder blows and the lateral motion would be greater.

Mr. HOPKINS thought that the difficulty was with imperfect construction. With perfect track the speed would make no difference, but track would get out of line and wheels irregular in shape. He had no doubt that there was less journal friction at higher speeds.

Mr. ADAMS said that the general opinion had been that 12 or 13 miles an hour was the most economical speed. When you doubled that speed he thought you would double the destruction, the blows on the track would be twice as hard. Many

years ago they had tried fast running on the Boston & Albany and had strewed the road with wrecks, in consequence. There was probably a saving in fuel, but many other items, chiefly repairs, would be increased.

Mr. FORNEY referred to the great saving in wages of train hands and other expenses, shown in running longer trains. Much had been said about fuel saved, but the fuel is not the only item. By running 25 instead of 12 miles per hour you had your crews on only half the time and could make a constant saving. As to repairs, he thought it probable that the blows struck on the track at 25 miles an hour did not do any appreciable injury to the track more than those at 12 miles.

Mr. ADAMS thought that the circumstances or condition of the track would make little difference. The momentum increased with the speed, and consequently the force of the blows struck on the wheels, track, etc., would be greater at the higher speed. He had not been in favor of train brakes for freight and did not see how they could be applied until there was more uniformity in the construction of cars. In his experience the greatest source of trouble was with the breaking of wheels. Now if a wheel broke under a car back in the train and the engineer did not see it the cars would be down the bank before he could put on the brake.

A motion to call the roll and request each member to give his opinion was here made and lost.

Mr. C. E. GAREY thought that if it cost less to run a train 25 miles than 12 miles an hour there would be no further difficulty as to the track. The fast speed being adopted, a train brake was necessary. If they had a brake which would operate on one or more cars independently it would make no difference how many cars there were in the train.

Mr. L. GAREY said that train brakes were certainly desirable. A prominent official had lately told him that, with a train brake, freight on through lines could be moved at less cost and with half the number of cars, by adopting higher rates of speed. This had been proved by the fast emigrant trains; the average repairs on cars running in those trains were less than on ordinary trains. There were no better means of controlling freight trains than 30 years ago. The great loss by collisions could be avoided by using train brakes. If a brake could be devised which could act on a car independently of the adjoining cars, the different styles of draw-heads and connections would make no difference. If there was such need for train brakes it was high time they were furnished.

Mr. ADAMS said that he was not absolutely opposed to train brakes, but he did not believe that one had been invented which could be applied and maintained at reasonable cost.

In answer to a question, Mr. RICHARDSON said that they had one on the Boston & Maine which worked well, so that they were going to put it on all their cars. Ten cars equipped with this brake in a train were enough, giving five to the engineer and five to the conductor. He had drawings with him.

Mr. ORTTON thought that the reduction of expense by increasing speed was doubtful. The great difficulty in the way of putting train brakes on freight trains was the constant interchange of cars. It would be very difficult to introduce them unless a first-class system could be devised and generally adopted.

Mr. FORD moved that further discussion be postponed until the next day at 11 o'clock.

Mr. ADAMS asked why it was that, if freight trains cost less at high speed, the expense of passenger trains increased as the speed increased? The power cost more, and he thought it would be so with freight trains.

Mr. FORNEY thought that there was a certain limit, and when that was passed the expenses would increase. In Chicago recently he had had a statement from a master mechanic giving the repairs of passenger engines at 5.53 and freight engines at 6.79 cents per mile, and he thought that there would be the same difference in cars. The road in question had many light freight trains and many heavy passenger trains, so that the average was about even.

The motion to postpone the discussion was then carried.

The PRESIDENT then announced the following committees:

On Subjects for Discussion at next annual meeting, Messrs. W. R. Davenport, F. D. Adams, John Kirby, P. A. Logan, Robert Miller, E. L. Bosdevex.

On Annual Dues, Messrs. A. Gleason, R. B. More, John Hackett.

On Correspondence, Messrs. M. N. Forney, David H. Baker.

On Place for Next Annual Meeting, Messrs. D. C. Richardson, R. B. More, John Kirby.

To Nominate Officers, Messrs. S. A. Davis, J. B. Hill, R. M. Hemphill.

The PRESIDENT then presented a number of invitations to visit manufacturing establishments, and stated that the manufacturers and merchants of Cleveland had tendered some courtesies which the resolutions passed two years ago prohibited them from accepting. These were of a different character.

The report of the Committee on Substituting Steel for Iron and Iron for Wood in Car Construction was then presented. It has been already published.

Mr. ORTTON asked whether any one had had experience with steel and iron axles. It had been stated that steel would heat more quickly than iron.

Mr. FORD said that his observation had not shown any difference as to heating, but he thought the steel axle wore away more quickly than iron, though he had had no opportunity for an exact test.

Mr. STEWART asked how long the steel axles had been in use and whether they were liable to break inside the hub of the wheel.

Mr. FORD said the axles had not been worn enough to be unsafe. They were under Pullman cars. He had had no case of a steel axle breaking and but one of an iron axle.

Mr. CHAMBERLAIN showed a drawing of a steel axle. He had had a few on trial for about three years. They had had trouble with one and on investigating it they found a wire-like formation running lengthwise through the axle. (He then showed several sketches of sections of iron and steel axles made with the aid of muriatic acid.) He was not prepared to give a final opinion.

Mr. HILL had had a set of steel axles under a coach with English wooden-centre wheels. They gave no more trouble than iron axles, but one of the journals broke inside the box after running three years.

Mr. HEMPHILL had had steel axles in constant use under two coal cars for eight years and still good.

Mr. STEWART began to use steel axles seven years ago. After a time they began to break and close examination showed little fibrous cracks running in perhaps an inch. These cracks were between the wheels. Iron would sometimes bend where the steel axles would break.

Mr. ORTTON had had a number of iron axles break inside the hub of the wheel. He had used steel axles under locomotives and found that the steel journals worked with a much finer surface than iron. They used steel crank-pins, and thought the lubrication better than on iron. He thought that iron would be substituted for wood in cars before long.

Mr. WIERS asked whether, in the brake experiments referred to in the report, there was an equal pressure on all the brakes.

Mr. HILL said yes, as nearly as possible.

Mr. ADAMS said that a difference might be caused by the kind of brake used and also by the way in which the car was moving.

Mr. ORTTON thought that there would be a difference resulting from the different friction on the metals. That ought to be considered as it would make an essential difference.

The convention then proceeded to consider some questions submitted.

The first was: What is the most economical and safe size for car wheels?

The PRESIDENT said there had been much agitation about using 38 in., 40 in. and 42 in. wheels. In Europe they use 48 in. wheels under passenger cars. If a change was to be made he thought it ought to be uniform.

Mr. ORTTON said that on the Grand Trunk they were using 42 in. wheels. He thought they were better, easier on the journals and on the track. In adopting them a larger journal must be used and he found that 7 by 3¼ in. gave very good results.

Mr. HOPKINS thought that the weight of the large wheels would make a difference on roads with heavy grades. On level roads he believed that the large wheel had many advantages. In going up a grade friction was not the chief element but weight. A large wheel would be easier on the track.

Mr. MOORE had one set of 42 in. wheels under a coach making a round trip between East Saginaw and Detroit, about 200 miles, daily. They were much pleased with them, thought they were easier on the track, caused less journal friction and would wear longer. The wheels they used were from Ramapo. They were now making trucks so as to use a second set.

Mr. HOPKINS thought there was no danger of adopting too large a wheel. He thought it a question whether 42 in. was large enough.

Mr. ORTTON thought it was easier to pull a large wheel up a grade than a small one. There was an advantage in small wheels on an engine, but that was a very different thing.

The Committee on Dues then presented their report, which was accepted.

Mr. ADAMS asked how many members paid their dues last year.

The SECRETARY said so few that the President would not let him read the names.

Mr. MORE suggested that some rule be adopted to enforce payment.

The SECRETARY said that most of those who attended the meetings paid promptly. A rule was adopted last year not to send the annual report to members in arrears, but he had received so many letters that he gave it up and sent the books.

Mr. C. E. GAREY moved to amend the constitution by adding to Section 4: "Or until three years in arrears for dues."

Pending consideration of this the convention adjourned until the evening.

Contributions.

General Office Accounts.

[From a forthcoming work entitled "Railway Revenue and its Collection," soon to be published.]

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GENERAL OFFICE ACCOUNTS AND HOW THEY ARE GROUPED; THE DIVERSITY THAT EXISTS; SUMMARY OF THE SYSTEM CONTEMPLATED.

In the preceding chapters and in the volume already published on RAILWAY DISBURSEMENTS, attention is especially directed to the keeping of the preparatory or abstract accounts by the agents and accountants along the line.

Reference is occasionally made, in an incidental way, to the disposition of the abstract accounts after they reach the general or department offices of the company; but no consecutive or detailed statement is anywhere attempted of the *modus operandi* of spreading the returns upon the general books after they pass from the hands of the subordinates at the stations, shops and elsewhere on the road.

This important information, necessarily known in a practical way to so few, would, it is believed, prove both interesting and instructive to many, and especially to the immense number of young men engaged in office duties upon our railways.

These young men are as a rule ambitious in the highest and best sense of the word, and their ambition leads them to desire thoroughly to comprehend every detail of their profession. In no other way can they hope to fit themselves so that, no matter to what department the vicissitudes of the service may call them, they will be prepared to discharge their duties creditably and efficiently.

The competition for preferment upon our railways is so active that only those who strive intelligently as well as indefatigably can be at all confident of ultimate success.

To the ignorant and unthinking, the various sub-divisions of railway service have apparently little or no relation to each other, but even a short practical acquaintance with the general operations of a road is sufficient to demonstrate that nothing of importance can be learned in any department that sooner or later will not be found essential to a full and clear understanding of some other branch of the service.

This is especially true in reference to general railway accounts. The accountant should possess an intimate knowledge of the minutiæ of the different classes of accounts through all their various stages, from their inception up to the time the essence of each is spread upon the general ledger.

Unless the accountant possesses this general information, he lacks in an important respect the intelligence necessary to make him really valuable to his employer; the knowledge which he possesses of his duties being cramped and confined, he lacks elasticity and comprehensiveness, and must not demur if others with greater tact outstrip him in the race of life.

As the exact duties performed by the different departments in connection with the accounts are rarely if ever exactly the same upon any two roads, it follows that the details to be observed in arranging the accounts preparatory to their being spread upon the general ledger varies upon different roads. The results finally arrived at are of course, approximately, the same under all systems, but all companies do not exercise the same degree of economy.

It is possible to exercise the greatest economy without for a moment losing sight of the necessity of preserving a permanent record of all the details that constitute the accounts of each agent and, in the aggregate, of the whole road. Upon some roads these important particulars are preserved upon loose pieces of paper, ill-arranged blotters, or are not preserved at all; upon other roads an elaborate system of bookkeeping is entered into in the different departments for the purpose of accurately fixing the accounts in the various stages of transition, from the time they leave the hands of the agent up to the period when the product is finally spread upon the general ledger.

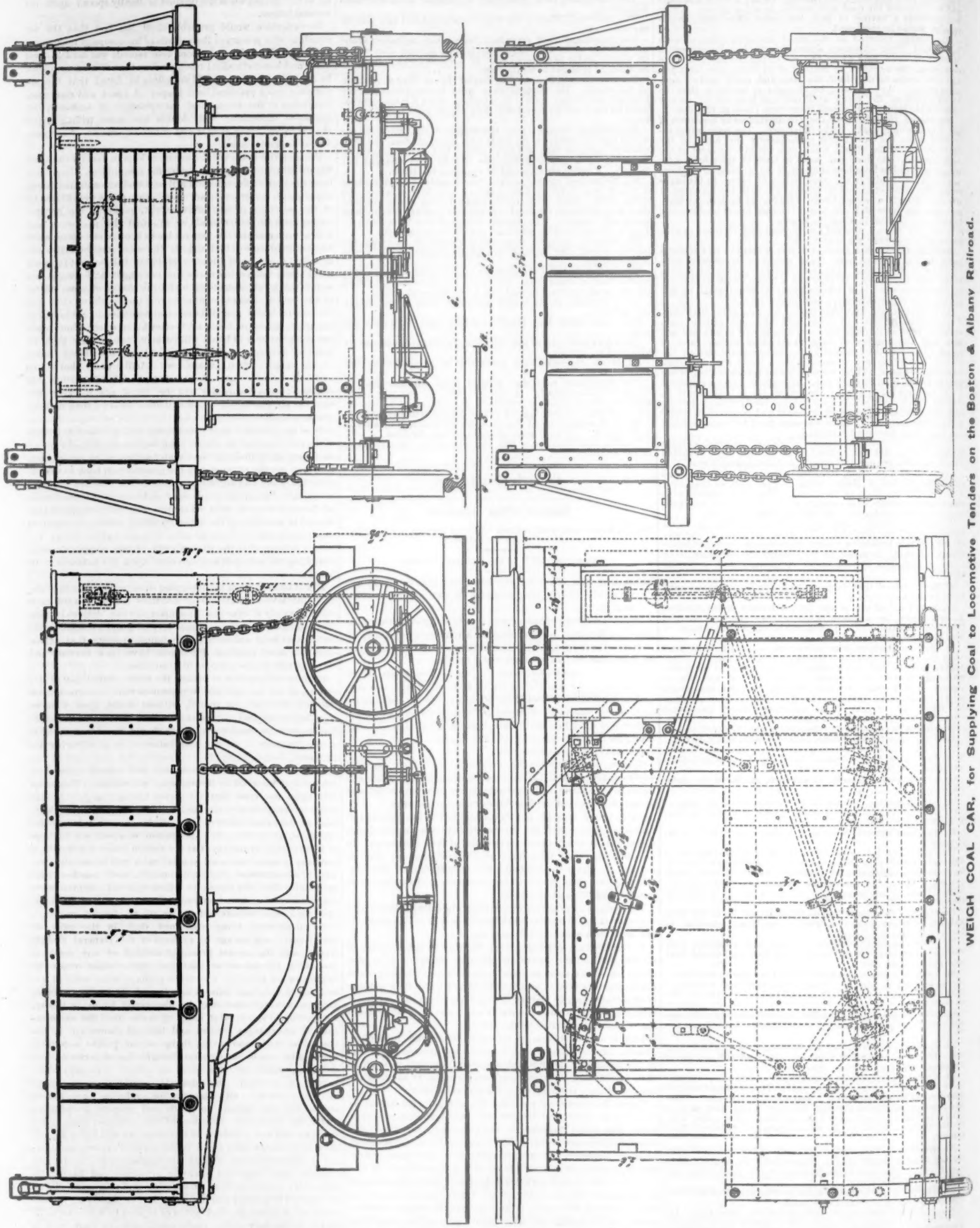
Investigation would probably elicit the fact that the accountant who preserved the records of his company upon loose papers and irregular and incomplete records was bred to some other and less methodical business than that of an accountant. In the other case, it would doubtless be found that the accountant was a practical book-keeper of exact and rigid cast, delighting in the mechanical manipulation of accounts, but harrassed incessantly with doubts lest some trifling detail should escape being caught and entered upon one of his ponderous books of record.

Upon no two roads are the accounts kept in exactly the same way, or arranged, as a whole, under the same officer. Upon some lines the bulk of the accounts will be found concentrated in one department, under one head; upon other roads we will find all of the accounts in one office except, perhaps, the general books; upon still other roads we will find the passenger and freight accounts and the general books kept in one office; upon another road we will find exactly the same state of affairs, except that a portion of the general books will be kept in some other office; upon other roads the passenger and freight accounts will be supplemented, under the charge of some officer, by the bulk of disbursement accounts; then again we shall find the general books and disbursement accounts in conjunction, the traffic accounts being kept elsewhere; upon other roads two complete sets of books will be kept, one in New York or London, perhaps, and another set at the home office of the road; then again we shall find that two sets of books are kept except that neither is complete; some companies will be found not to keep any books at all, practically; upon still other lines we shall find the accounts in all sorts of places, kept by all sorts of people, the custody of the general ledger constituting perhaps the sole charge of the chief accounting officer; upon the last-mentioned road we shall very likely discover the Cashier acting as an accountant, charging out the payments on the general cash book to the various operating and current accounts at the time the vouchers are paid.* Upon some roads the freight accountant has charge of the car accounts; upon others this duty will perhaps be performed in the office of the Superintendent; elsewhere, a distinct department will be found to exist, with an Auditor of Car Accounts looking after the whereabouts of the company's cars, compiling the accounts and agreeing upon the balances with other lines.

It will be seen from the foregoing illustrations that the relation the several branches of accounts occupy toward each other is rarely if ever the same upon any two different roads. The combinations are sometimes very odd, and a volume might be filled without exhausting the infinite variety that exists. Only the more common differences have been noticed, and those merely for the purpose of illustration.

If we should succeed in finding the same conjunction of accounts, so far as outward appearances were concerned, upon two different roads, we should, without doubt, upon a more close inspection find very marked radical differences to exist. For instance, in one department we should discover an intelligent adjustment of checks and balances; in an adjoining department, details, petty in themselves, but necessary to the completeness of the whole, we should find entirely ignored or rendered of no avail by incongruous association. We should find upon one road that the person having charge of freight accounts does not have the custody of the original freight waybills, or the examination of them will be intrusted to another officer, or, more likely, no examination whatever will be made of them except by the agent at the station where the freight is consigned; upon one road special rates will be annulled annually, upon another road semi-annually, upon another road no definite time ever comes for a thorough and comprehensive overhauling of each and every special arrangement in force; one road will require duplicates of all freight way-bills, these duplicates being examined daily in the office of the freight accountant, or perhaps of the General Freight Agent, and the agents promptly notified of any error in the rates, extensions or footings; upon other roads no duplicates are required, a pretence perhaps being made of examining the original bills at the close of the week or month, any undercharge that may be discovered being, in theory, charged up to the agent in fault; upon one road the examination of overcharges, rebates and kindred claims will be intrusted to the person having charge of the freight accounts; upon other roads the General Freight Agent performs this duty; elsewhere we will find an officer especially delegated to perform this delicate service; upon many of our roads, all claims for injuries to person and for loss and damage to goods and property are adjusted under the immediate direction of the Solicitor; upon other roads we will find a division of the labor; we will find a department in existence, with a well-drilled corps of experts, possessing a skillful surgeon and all the appliances for conducting business upon approved scientific principles, and having no other duty to perform than to examine and pass upon claims for injuries to persons and for goods lost or damaged; the adjustment of claims for stock killed or injured by trains we shall find to be the duty of the roadmasters upon one road; upon a neighboring line we shall find the duty intrusted entirely to the Division Superintendent, upon the theory that those officers possess the appliances and the intelligence to ascertain more promptly and accurately the extent and nature of the damage sustained than any other department of the service. Upon one road we will find that the officer authorized to purchase the supplies of the company attends exclusively to the receiving of them after they are purchased, and vouches for the accounts upon which payment is made; upon another line independent agents will perhaps receive and inspect certain classes of the material purchased, but the

* This system is of course impossible with the companies which charge up their liabilities from month to month as they accrue without reference to the time of payment.



payment will very likely be made on the sole certificate of the party making the purchase, thus rendering the inspection nugatory.

Upon no two roads, then, may we expect to find the accounts audited under exactly the same circumstances.

It is not necessary for our purpose to attempt to explain or classify the elements at work in each organization that bring about such a prolixity of systems. Let us accept the facts as we find them, and so far as the peculiarity of the accounts are concerned, or the relation the different departments bear to each other, accept the arrangement as the same is already described herein at length and in the book already referred to on RAILWAY DISBURSEMENTS.

While the system of accounts they refer to may not perhaps be the best, nevertheless the rules governing it are known and tolerably well-defined; it is consequently open to investigation as a whole, and can be carefully analyzed, and its defects as compared with other systems pointed out and corrected.

The system described in *Railway Disbursements* and in the preceding parts of this book is arranged without any attempt whatever to secure *theoretical* perfection.

No attempt is made to secure perfection of detail in petty matters when the cost of the same would seem, from practical acquaintance, to be greater than the results would warrant. Yet the necessity of enforcing every proper check is never for a moment lost sight of.

The returns are, so far as practicable, allowed to reach the general accounting officer through the hands of the department officers and division superintendents of the company.

This plan enables the officers to acquaint themselves generally with the details of their several branches of business.

The rules governing disbursement accounts are especially arranged with the direct view of utilizing to the utmost the labor of every person through whose hands the accounts naturally pass. Whatever work is performed by each is made to contribute something to the grand whole, thus greatly lessening the force required in the office of the chief accounting officer. In his office the details are examined, but only the aggregates are transcribed on the general books.

The following may be said to be the distinguishing features of the system referred to above, more particularly perhaps as regards the arrangement of the accounts at the headquarters of the company:

1st. Traffic and expense accounts are examined, audited and balanced monthly.

2d. The total cash collections of agents are remitted daily in bulk without reference to the source from which derived.

3d. The person in charge of the treasury department at the local headquarters of the company is the general accounting officer of the road, the title of this officer being Local Treasurer.

4th. The passage tickets of the company are under the charge and direction of the General Ticket Agent. The reports of the passenger traffic accounts of agents and conductors are transmitted to the General Ticket Agent. The passenger accounts, including reports of collections for extra baggage, are examined and audited in the general ticket office. At the end of the month, or as early as the 19th of the succeeding month, the General Ticket Agent reports to the accounting officer the amount due from each agent and conductor. All tickets collected by conductors are forthwith transmitted to the Ticket Auditor. The Ticket Auditor, acting under the instructions of the Local Treasurer, exercises a general supervision over the accounts kept in the general ticket office. The keeping of the ticket accounts by the Ticket Auditor instead of the General Ticket Agent is suggested and in some cases recommended.

5th. The freight traffic reports are transmitted directly to the Freight Auditor, an officer of the treasury department, entirely independent of the General Freight Agent. The Freight Auditor examines the returns from agents and ascertains the amount due from each. He ascertains the balances due to or from each connecting line on account of joint traffic. At the close of each month, or before the 20th of the succeeding month, the Freight Auditor reports to the accounting officer the amount due from each agent, also the amount due to or from each freight line. Duplicate way-bills or manifests are transmitted by agents daily to the Freight Auditor for examination and correction. The Freight Auditor examines and passes upon all claims for overcharge and rebate, the details in his office permitting him to ascertain readily if an overcharge occurred, and if so, that it has not already been refunded.

6th. The car-service accounts are kept in the office of the Car Accountant. At the end of each month he reports to the Local Treasurer the amount due to other companies for the use of their cars. He also reports to each company the amount due to it, and receives in return a report of the amount due from it.

7th. The Auditor proper is the *Register* of the company. As regards the accounts, the records of the Auditor's office are peculiar and his duties are anomalous. He keeps three books or registers. In the first, termed "Audited Bills," he enters the total amount of all bills due by the company; in the second, or 'Railway Register," he enters all bills due from railway companies; in the third, termed "Various Persons Bills," he enters all bills due from other corporations and individuals. The last two registers may be consolidated upon small lines where only one ledger is required for keeping "Railroad" and "Various Persons" accounts. All bills, after being entered by the Auditor and approved for payment by the proper officer, are transmitted to the Treasurer. When the accounts for the month are closed, the results, as spread upon the register, are certified to the Local Treasurer by the Auditor, for entry on the general books. It is not perhaps essential that the bills should be entered in the office of the Auditor; the recording of them, however, affords him information that it is important he should have from some source, to enable him to perform the important and responsible duty of his office, namely, that of examiner of the affairs of the Local Treasurer. The recording of bills by the Auditor enables him intelligently to keep track of every bill in the treasury, countersign all checks drawn by the Local Treasurer, and it otherwise facilitates his, the Auditor's, labors in examining the accounts of the treasury department. *In the interest of* ECONOMY, *and for that reason only*, the work of entering the bills in the office of the Auditor is further utilized by making his registers a *quasi* clearing-house for distributing such accounts as he enters upon his registers where they naturally belong. A description of these duties will, however, be found elsewhere, with a description of the registers or journals enumerated above, which he keeps.

8th. All reports connected with disbursements are transmitted directly to the Local Treasurer. An Auditor of Disbursement Accounts constitutes a part of the immediate force of the Local Treasurer. The auditing of the expenditures of material and labor upon the road is one of the most important of the duties devolving upon the accounting officer. A proper performance of these duties requires that he should have general and special supervision over all accounts of the company and the records pertaining thereto. The reports required in connection with the expenditures of the company are fully described in *Railway Disbursements*. In addition to the returns made by the Auditor already described, the reports required are generally as follows: 1st, The pay-rolls, each roll being accompanied by a statement specifying the accounts upon which the labor was expended and to which the roll should be charged. 2d, The returns of the Auditor. 3d, The statements and distribution of material books returned by the Purchasing Agent, storekeepers and shop clerks; these books give in detail the material received and expended during the month, including the fuel used.

9th. A book account is opened in the office of the Purchasing Agent with each individual, firm or corporation from whom purchases are made. For this purpose, a common journal or record book is used. The record, after reciting the name, further specifies the date of delivery of goods, the articles, rate and amount. All vouchers for material and supplies of all kinds, manufactured or otherwise, no matter by whom purchased, should be entered in this record book, so as to concentrate the material accounts as much as possible, and thus prevent the duplication of bills and the consequent payment of the same account twice. In entering invoices and bills in the record book careful reference is made to the preceding entries to prevent the possibility of duplicating an account.* At the end of each month, or upon the receipt of statements of account from merchants and others having claims against the company,† the said statements are compared and made to agree with the details spread upon the record book from the invoices, as explained. The account is then ready to be audited for payment. A book specifying the distribution of the material purchased and delivered each month is filed by the Purchasing Agent with the Local Treasurer as soon as the accounts are closed each month. This book is similar to the "Distribution of Material" books required by the accounting officer from storekeepers and clerks at shops.

* A similar record account should be kept by each department of the claims against the company passed upon in such department.

† The form of voucher used by the railway company should be used in making this statement.

Errors in a Translation of Weyrauch.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Having recently used Prof. Weyrauch's valuable book on "Iron and Steel Constructions," published by Van Nostrand, and having found several errors, I desire to call the attention of your readers to a few of them, and impress upon them the importance of verifying the formulas before putting them to practical use.

The difficulty of making a translation from German into English is doubtless great, but in a work of this kind, designed especially for practical men, it will be admitted that great pains should be taken to have the formulas correctly printed, so that any one can use them without being obliged to verify them.

I wish in this place to call attention to only a few of the more important ones, such especially as would be fatal to any structure if its strength depended upon results obtained from their use.

On page 53 we find

$$b = 700 \left\{ \frac{1}{2} \frac{\text{max. } M' x}{\text{max. } M x} \right\},$$

which should be

$$b = 700 \left\{ 1 - \frac{1}{2} \frac{\text{max. } M' x}{\text{max. } M x} \right\}.$$

On page 60 we find

$$a' = u' \left\{ 1 - \frac{l' u'}{u'} \right\} \frac{\text{min. } B}{\text{max. } B},$$

which should be

$$a' = u' \left\{ 1 + \frac{l' u'}{u'} \cdot \frac{\text{min. } B}{\text{max. } B} \right\}.$$

On the same page, we find

$$a' = u' \left\{ 1 - \frac{u' s'}{u'} \right\} \frac{\text{max. } B'}{\text{max. } B},$$

which should be

$$a' = u' \left\{ 1 - \frac{u' s'}{u'} \cdot \frac{\text{max. } B'}{\text{max. } B} \right\}.$$

On page 64 we find

$$d = \frac{q\, l}{930 + 1 + \frac{p}{2\,q}\ h o},$$

which should be

$$d = \frac{q\, l}{930 \left\{ 1 + \frac{p}{2\,q} \right\} h o}.$$

On page 73 we find

$$n i = \frac{d}{\P\, d i} \times \frac{\text{max. } B}{b'} = \frac{5}{\P\, d i} \times \frac{\text{max. } B}{b} \times \frac{5}{\P\, d i} F \text{ (26)},$$

which should be

$$n i = \frac{d}{\P\, d i} \times \frac{\text{max. } B}{b'} = \frac{5}{\P\, d i} \cdot \frac{\text{max. } B}{b} = \frac{5}{\P\, d i} F \text{ (26)}.$$

Also on the same page,

$$\frac{5}{i\, \P\, d i} = F \frac{n i}{i} \text{ (27)},$$

which should be

$$\frac{5}{i\, \P\, d i} F = \frac{n i}{i} \text{ (27)}.$$

On page 88 we find

$$e \text{ II} = \P i\, d\, h\, o, \text{ etc.},$$

which should be

$$e \text{ II} = \P\, d i\, h\, o, \text{ etc.}$$

Also at the bottom of the same page we find

$$\gamma = \frac{3}{5} d = 3\, m,$$

which should be

$$\gamma = \frac{3}{5}, d = 3\, c, m.$$

On page 102 we find

$$\frac{B c + \frac{5}{6} \text{ max. } B c}{F} = \frac{B c + \frac{5}{6} \text{ max. } B v}{\sigma \text{ max. } B v} = 1600,$$

which should be

$$\frac{b = B c + \frac{5}{6} \text{ max. } B v}{F} = \frac{B c + \frac{5}{6} \text{ max. } B v}{\sigma \text{ max. } B v} \times 1600.$$

There are other errors equally important, but it is not our purpose to correct the book. We think the usefulness of this little volume would be greatly enhanced if it were thoroughly corrected and reprinted.

It would be a matter of great convenience to most of its readers if there was a table for the reduction of the French metric system to English measures accompanying the book.

JOHN RAPELJE.

The Publishers of Weyrauch.

NEW HAVEN, Conn., June 22, 1877.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The statement of facts made by Mr. D. Van Nostrand needs amendment and correction. On Feb. 11 I arranged with him to translate Weyrauch's book, *provided that I could obtain the author's consent*. On Feb. 18 I withdrew from the arrangement, *because I had learned that the author had authorized another party to make the translation*. Then he "put the work in other hands." MANSFIELD MERRIMAN.

The Springfield Locomotive Tests.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your correspondent "W." seems to be right in his remarks. The slip cut from the Springfield *Republican* was evidently written by some reporter from information given by some one connected with, or interested in, the experiment.

It is well known that certain engines slip more than others. They may have compensating qualities that recommend them to engineers. In all these experiments there is so much opinion and so few facts that one can scarcely do more than shrug his shoulders and wait for time to get at the real instead of the partial truth.

The fact is that at no time did the Nashville give out her full estimated power. She stalled when exerting a tension of 20,000 lbs. The pressure at that time is not stated, for obvious reasons. This engine should exert a tension of 156 lbs. for every pound pressure of steam, or with a pressure of 135 lbs., as mentioned, should have shown a tension of 21,080 lbs. If this had been done without sand it would have shown the remarkable co-efficient of 221 of steel upon steel, as I suppose tires and rails were steel.

This would have given about 900 lbs. per ton of adhesion. Even with tension exerted, when engine stalled there was shown an adhesion of 850 lbs. per ton of weight on drivers. In ordinary good weather this engine would not have had an adhesion of over 14,400 lbs., and should have slipped with a steam pressure of about 92 lbs. If this engine has accomplished all that is said, we must increase the co-efficient of friction to correspond. It is due to the profession to have an exact statement.

1st. Did the engine show a tension of 20,000 lbs., or was it merely the sudden vibrations of the instrument, caused by the jerking motion of an engine with a heavy pressure, low wheel and a very long stroke? In experiments made by the writer in 68 or '69 he observed this: the instrument frequently went 1,000 lbs. more than was really due to the normal tension. Any one who has been on an engine laboring heavily will know what is meant, as when an engine is running very slow there is a short period of time when tension is alone sustained by one cylinder, which is then exerting its maximum effect, the crank being nearly vertical, just before steam is admitted to the other cylinder. On its being admitted there is a sudden increase of tension shown by the instrument, which subsides as suddenly as made. This is probably the condition when the 20,000 lbs. was exerted. Mention is made that this engine is not subject to these shocks and pressure is uniform. Is this possible?

2d. The condition of track as regards the weather was mentioned as clear. This shows again that advantage was taken of this for the experiment.

3d. Will this engine accomplish these results on a neighboring road in the hands of other men, *i. e.*, is this the normal work of the engine, or is it an experiment in which advantage is taken of everything to attain a result? It is not certain that the Mogul experiment of last year was a satisfactory one. Had these engines been built by regular builders, and thrown indiscriminately among their customers, would these results have come out as the characteristics of the engines? If yes, then they establish a new line of departure.

About twenty-five years ago a master mechanic on a Vermont road took all sand boxes off, and the amount of work done by the engines and their regularity of time was not impaired. Does this prove that all engines should or could run without sand?

About twenty years ago there was a rivalry between engines built by Morse of Cincinnati and those built by the Cuyahoga Works in Cleveland. The engines were transferred from one road to another, but the remarkable result shown on their own roads was not borne out by the transfer. Mr. R. Bromley could give some interesting data in regard to this, as I think he ran them on both roads. S.

Weigh Coal Cars.

We illustrate this week a weigh car used on the Boston & Albany Railroad for supplying and weighing the coal furnished to locomotives. The coal on this road is stored in elevated bins, into which it is shoveled by hand from the cars on which it is transported. The weigh cars are loaded from the bins and run on tracks elevated sufficiently so that they can be dumped directly into the tenders. By this arrangement a very accurate account can be kept of the coal furnished to the engines, because each car-load is weighed separately. The construction of the cars is shown by the engravings with sufficient clearness, so that no description is needed.

The scales are placed underneath the framing of the car, and the dump body rests entirely on the scales, so that the contents can be weighed every time the body is filled. Although the arrangement of the car is very good, we are inclined to believe that the facilities employed on that line for handling the coal are more expensive than that of the coal shutes used on other roads and illustrated in the last number of the *Railroad Gazette*.

—Mr. G. W. Terry, until recently Master Mechanic of the Atlanta & Richmond Air Line, was presented with a silver service by the employes of the road. The presentation took place at his residence in Atlanta, Ga., on the evening of June 23.

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Editorial Announcements.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Addresses.—*Business letters should be addressed and drafts made payable to* THE RAILROAD GAZETTE. *Communications for the attention of the Editors should be addressed* EDITOR RAILROAD GAZETTE.

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies, the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

UNITED STATES RAILROAD STATISTICS FOR 1876.

The introduction to the new issue of Poor's Manual, most of which we copied last week, is an extremely interesting document. Though not including the operations of a single year, many of the reports covering only the year ending with June, 1876, and still more the year ending with September of that year, while a few come down to April or May of this year, still it comes nearer than anything else attainable to being a presentation of the operations of the calendar year 1876. So far as mileage is concerned, the record is now quite complete, which was far from the case in the earlier issues of the Manual. The book has returns of capital, earnings and expenses of 73,508 miles of railroad out of a total of 77,470 miles which it reports as having been *in operation* at the close of 1876. As it reports about 2,800 miles opened for traffic within the year (not necessarily built or even completed that year), and as these roads for the most part had not completed a year's business and made out a report of it, the margin of non-reporting roads must be quite small. It is desirable, however, that we should know what they are, and it would add to the value of the summaries given in the Manual if a list were given of the roads in operation not included in the summaries. We should know then whether the omissions were any of them important roads, and whether they would have been likely to bring up or down the averages of capital, earnings, expenses, etc., per mile of road.

It would also be a great improvement, and serve to make future editions of the work more complete, if a list of the new roads and additions to old ones were given in each edition of the Manual. We are told this year that the book has returns from 73,508 miles of road, against 71,759 miles the year previous; but there is no way of ascertaining of what the additional 1,749 miles consist. A list of the additions would not be very long, and is indispensable as a criterion of the completeness of the work. We would say without hesitation that the mileages of yearly additions given are far from correct, if they included simply the mileage on which track was laid during the year and all of that mileage. We have reported that mileage now for several years, and reported it in detail, describing each section separately, and thus advertising, as it were, for corrections. Our reports we know to be very nearly complete. But in Poor's Manual the new mileage is mileage opened, and this frequently includes road which was completed in the previous year—somet.mes early in that year. Thus our yearly "Record of New Railroad Construction" is a different list from that which would include the mileage given in Poor's Manual as the additions made during the year.

The statistics of the Manual show that the 73,508 miles of railroad which reported in 1876–77 earned gross 1½ per cent. less than the 71,759 miles which reported the previous year, but earned net ½ per cent. more, the working expenses having been reduced 5 per cent. Contrary to the almost universal assumption, the passenger earnings were considerably smaller than in 1875, and smaller even than in any year since 1872, though the mileage was 11 per cent. greater than in 1873. However, we should bear in mind that many of the roads whose reports are included closed their reports before the Centennial traffic was at all large. Thus most of the Ohio roads, probably, are reported in the Manual for the year ending with June and all the New York roads for the year ending with September, when there had been but about a month of really heavy Centennial traffic. The decrease in earnings shown in the Manual was 2.15 per cent. in passenger and 0.77 per cent. in freight earnings.

The increase in capital, share and funded, is reported as 1.2 per cent., the increase in mileage being 3.8 per cent., there being thus a decrease in the average capital account per mile, the change being, as will be shown further on, from $61,533 to $60,791 per mile. The turn in this direction is likely to continue, partly because the new roads built are for the most part cheap, and partly because of the numerous foreclosures by which old stock is destroyed. The foreclosure process, however, does not always reduce a company's nominal capital. Bondholders when they reorganize seem to have a passion for paper, and many of them grant themselves so many shares and bonds that the capital is not decreased, and it is sometimes increased. In this connection we must express our regret that the summaries of the Manual do not classify the additions to capital—show how much has been added on account of new roads, what have been the changes in the old solvent roads, and what in roads foreclosed and reorganized, and especially the additions made by "funding coupons"—a process by which some companies, we fear, are heaping up wrath against a future day of wrath, increasing a funded debt already too large without any addition or pretense of an addition to the property which is to earn interest on that capital. Until last year the average capital per mile of road has increased constantly in this country, while at the same time the average earnings, gross and net, have been decreasing. Last year shows on the average a decrease in the capital account, which makes the position of those which are increasing theirs all the more precarious.

The progress of capital and floating debt (the latter has been reported separately from funded debt only for the last two years), gross and net earnings, *per mile of road*, as deduced from the statistics of the Manual, has been for six years:

Year.	Stock and debts.	Gross earnings.	Net earnings	P. c. of net earn. to capital.
1871	$59,726	$9,040	$3,177	5.32
1872	55,116	8,116	2,892	5.25
1873	57,136	7,947	2,775	4.86
1874	60,944	7,513	2,737	4.49
1875	61,533*	7,010	2,585	*4.20
1876	60,791*	6,764	2,536	*4.16

*Not including floating debt.

The reduction in the average capital per mile from 1871 to 1872 is probably chiefly due to the greater completeness of the Manual for the second year. Nearly 13,000 miles more were covered by the figures of the latter year, and fully half of that was of old roads, probably the less important ones, with a smaller capital account than the average. After that there was an uninterrupted growth of the average stock and debt account per mile until last year, co-incident with an uninterrupted decrease in the gross and net earnings. The average return on the nominal capital invested has fallen off 22 per cent. within the six years.

Since 1872 the changes in the total amount of net earnings have been comparatively trifling, the greatest being but 3 per cent. more than the least, and those of 1876 but 1.4 per cent. different (greater) from those of 1873, mileage meanwhile having increased 11 per cent. and capital 18 per cent. What is remarkable is that in spite of the largely increased capital and the stationary net earnings, the share capital has received about the same amount in dividends. Nothing seems to have been taken from it to provide interest for bonds. The amount paid in dividends was $68,000,000 in 1876, against $67,000,000 in 1873 and 1874 and $74,300,000 in 1875. Next year's figures will tell a different story, as the misfortunes of the coal roads will take an enormous amount from the total dividend payments; but it is a fact that until recently, the reductions and suspensions of dividends have been comparatively small, and on the whole balanced by the payments begun on the Pacific railroads. If we subtract the sums paid in dividends from the total net earnings we shall have the balance left from which interest on bonds must be paid, as follows:

	Net Earnings less Dividends. Total.	Per mile.
1871	$85,289,723	$1,910
1872	101,236,216	1,770
1873	116,689,853	1,760
1874	122,528,016	1,770
1875	111,212,230	1,550
1876	118,413,084	1,610

Of the entire $68,039,668 paid in dividends, no less than 49½ per cent. was paid by the railroads of the Middle States, which have but 18½ per cent. of the total mileage, while the Western States, with 50 per cent. of the mileage, paid but 25½ per cent of the dividends. These percentages for the several groups were:

	P. c. of mileage.	P. c. of dividends.
New England	8	11¼
Middle States	18½	49¼
Western States	50	25½
Southern States	19	2¾
Pacific States	1¾	¾
Pacific railroads	3	10¾
Total	100	100

To earn 7 per cent. on the stock and funded debt of the railroads of the United States in 1876, net earnings amounting to $4,255 per mile of road would have been required, which is 68 per cent. more than the actual net earnings. This result could have been attained only by an increase of 25 per cent. in the rates received on the amount of traffic actually carried.

The progress of earnings, expenses, and net earnings, as shown by the Manual, is presented below, per mile of road. It must be remembered that the earlier issues of the Manual were less complete than the later ones, and the omissions in these earlier issues were chiefly of roads of light traffic, so that doubtless the amounts for the earlier years are not the true average but something greater; and thus the decrease of late years appears greater that it really has been:

Year.	Earnings.	Expenses.	Net earnings.	P. c. of expenses.
1871	$9,040	$5,863	$3,177	64.86
1872	8,116	5,224	2,892	64.37
1873	7,947	5,172	2,775	65.06
1874	7,513	4 776	2,737	63.56
1875	7,010	4,425	2,585	63.12
1876	6,764	4,228	2,536	62.49

Since 1871 the reduction in earnings per mile has been 25.2 per cent., in expenses 27.8, and in net earnings 20.2 per cent. The proportion of working expenses is but little lower than formerly, notwithstanding the great decrease in the cost per unit of traffic, the cause being that rates have been reduced faster than expenses.

To give a simple and intelligible view of the business of the year compared with that of the preceding year, we have made the following statement of the leading facts *per mile of road*:

United States Railroads for Two Years.

Per Mile of Road.	1876.	1875.	Decrease.	P.c.
Capital stock	$30,587	$30,639	$52	0.2
Funded debt	30,204	30,894	690	2.2
Total capital	$60,791	$61,533	$742	1.2
Freight earnings	$4,913	$5,072	$159	3.1
Passenger earnings	1,851	1,938	87	4.5
Total earnings	$6,764	$7,010	$246	3.5
Working expenses	4,228	4,425	197	4.5
Net earnings	$2,536	$2,585	$49	2.0
Dividends paid	926	1,035	109	10.5
Per cent. of expenses	62.50	63.12	..	..
Per cent. of net earnings on capital	4.16	3.98	..	..
Per cent. of dividends on stock	3.03	3.38	..	..
Per cent. of net earnings, less dividends, on bonds	5.33	4.53	..	..

One of the noticeable features of the introduction to the Manual which we published last week is the statement of mileage, gross earnings, net earnings and dividends of the railroads of different groups of States for four years past. Some interesting facts may be deduced from this table, not the least of which is the relation between increase of mileage and increase or decrease of earnings. Making a comparison between 1876 and 1873, it seems actually that not only has the increase in mileage brought no increase in earnings, but that the decrease in earnings has been largest where the increase in mileage has been greatest. We are here not comparing earnings per mile: it was to be expected they would fall off when the mileage was largely increased, but the total earnings. When a state has increased its mileage it has earned not only less than before, but the decline has been greater than in States which have increased their mileage less rapidly. This is shown below:

	P. c. of Inc. of mileage.	P. c. of Dec. of earnings.
New England	9.0	11.4
Middle States	9.7	8.4
Western States	11.5	12.0
Southern States	0.3	5.8

The only exception in the list above is in the case of the Middle States. The Southern States, which added least to their mileage, suffered the least reduction of total earnings; the Western States, which made the greatest increase of mileage, suffered the greatest reduction of receipts:

The figures of this table we have reduced below per mile of road:

	Earnings. Passenger.	Freight.	Total.	Net.	Dividends.
New England	$3,543	$4,365	$7,913	$2,659	$1,316
Middle States	3,479	9,536	13,015	5,084	2,468
Western States*	1,160	3,907	5,067	1,739	437
Southern States	953	2,786	3,636	1,227	139
Pacific States†	1,535	3,673	5,208	2,070	167
Pacific railroads	4,539	9,247	13,786	7,567	3,242

*Not including Union Pacific.
†Not including Central Pacific.

New England, the Middle States and the Pacific rail-

roads have more than the average earnings, the others, with more than 70 per cent. of the total mileage, have less than the average earnings, and the former three groups are the only ones which have net earnings equal to 7 per cent. on a capital cost of $30,000 per mile. Capitalizing the net income at this rate, the railroads of the Southern States are worth but $17,500 per mile, those of the Western States $24,850, those of the Pacific States $29,570, the New England roads $37,985, the Middle States roads $72,630, and the Pacific railroads $108,100 per mile, the average of the whole United States being $36,230.

All these figures must be taken with several grains of allowance. The publishers of the Manual are unable to secure complete returns from the railroad companies, and there are likely to be omissions of some figures—as of floating debt, for instance—to a greater extent than of others. The figures are simply the best we have, and the deductions from them approximately correct.

The Decline in the Values of Stocks.

The *Daily Graphic* of New York sometimes presents statistics very effectively by graphical methods, one of the subjects chosen being the course of stocks on the New York Stock Exchange for each month. An example of more general interest, especially to railroad men and investors in railroad securities, was that in the number for June 21, which showed the fluctuations in the values of the total stock capital of twelve railroad companies for 47 months—from July 1, 1873, to May 31, 1877. These statistics are presented in the ordinary way, with horizontal lines for values and perpendicular lines for time (one for each quarter). The fluctuations are shown very strikingly, and also the course of the stocks of different companies in comparison with each other. We give below round figures for the highest and lowest values of 1873, the lowest values 1874, 1875 and 1876, and the lowest value in May, 1877, as indicated by the chart:

Course of Values of the Stock Capital of Fourteen Railroads for four years, in Millions of Dollars.

	1873. Highest.	1873. Lowest.	1874. Lowest.	1875. Lowest.	1876. Lowest.	May, 1877. Lowest.
N. Y. C. & H. R.	94½	73	84	90	87½	79½
C., R. I. & P.	28	20	23	25	24½	20½
L. S. & M. S.	48½	38	35	27½	26	23½
Mich. Cen.	18	12½	13	11½	10	7
Ill. Cen.	34	28	26	26	20	14½
D., L. & W.	24½	19	22	24½	18	10
D. & H.	24½	20	22	22½	13½	7
Reading	17	16½	18	18	7	4
C. & N. W.	29	16	15¼	18	17½	12½
C., M. & St. P.	16½	8½	11	10	7½	8½
O. & M.	11	6½	6½	4	2	1¾
Erie	57	40¼	25	12½	9½	5
N. J. Cen.	21	17	19	20	5½	1¾
T., W. & W	12	5	4	½	¾	½
Totals	435½	320½	324	307	248¾	195¼

Of course this does not give all the information shown on the chart, which shows the highest and lowest value in each quarter until 1877, and for each month of this year. We have footed the figures, however, and the totals show what there was not room enough for on the chart. These totals are very striking, and illustrate vividly the enormous fluctuations in the values of railroad stocks.

We find that what sold for $435,500,000 four years ago, last month was worth but $195,500,000, the fall in value being $240,000,000, or 55 per cent. And this is but a fraction of the whole railroad stock capital of the country. The Pennsylvania, the Baltimore & Ohio, the Chicago & Alton, the Chicago, Burlington & Quincy, all the New England roads and all the Southern roads are omitted, as also are the Pacific roads, whose shares, however, are now worth more, and not less, than in 1873. The other stocks which had a market value, however, have probably not depreciated in quite so great a proportion as the average of those included by the *Graphic's* statistician. New England stocks have generally held their own pretty well, and we can remember few anywhere which ever paid dividends which have fallen so much as 55 per cent., aside from those included in the list.

But while the entire amount of depreciation of stocks is not shown by these figures, the other class of railroad securities, nearly equaling the stocks in their face value and very greatly exceeding them in actual value—the railroad bonded debt—is not considered at all in these statistics, so that it does not show, as it does not pretend to, the total fall in values of the entire railroad properties named—much less of the whole railroad property of the country. The reduction in the value of bonds has probably been much greater in amount than that of stocks, though probably not so large a proportion of the total value. The reduction, however, is not very great in the case of those roads whose stocks ever had any considerable value, but is chiefly in those which never paid dividends—whose entire actual capital was chiefly represented by its funded debt. The bonds of the dividend-paying roads are now for the most part worth more than in 1873, and in making up the values, some roads would show an increase under the head of funded debt values which would go far to balance the decrease in the stock values. However, the decline in value on the several hundreds of millions of bonds which failed to pay interest since 1873 is so enormous as to make these cases of appreciation in value seem trifling.

The *Graphic* chart was prepared by a professional statistician who has recently come to this country, Mr. Wm. M. Kahlow, late of London, where he prepared and published a series of very elaborate charts showing the condition and progress of the British railroad companies, which we have seen highly praised in English and German railroad journals. The *Graphic* chart is not a very good example of his work, however, which is usually presented in a peculiar way, and, like all graphical statistics, is made much clearer by the use of colors. This grapho-statistical method may be used to great advantage elsewhere than in books and publications, for example, to show railroad traffic and operating statistics where it is important that managers and other officers should keep the fact, in mind, or be able at a glance to ascertain them and their sequence. It is extremely difficult for any one to hold in his mind a distinct impression of general facts presented by tables of figures, when a graphical presentation would be instantly apprehended and perhaps impressed on the memory.

The Grain Movement for Nine Weeks.

The total shipments of grain from our Northwestern markets since navigation opened, from April 15 to June 16, nine weeks, by lake and by rail, have been:

	By lake.	By rail.	Total.	P. c. by rail.
1874	24,608,212	9,889,239	34,497,451	28.7
1875	12,365,724	9,919,977	22,285,701	44.9
1876	18,450,380	18,459,131	36,909,511	50.1
1877	13,444,026	9,407,886	22,851,912	41.4

A comparison with last year alone is misleading, as it is notorious that the movement last year was exceptional, nearly twice as much going by rail as in any previous year, by reason of the extremely low and unprofitable rail rates. Aside from 1876 the movement by rail for the other three years has varied singularly little in *amount*. There is nothing particularly unfavorable to the railroads in these figures, and indeed their business this year would be a very great improvement over that of last year if they were getting their regular rates. Doubtless, however, much of the grain this year has been carried on contracts made last year, and probably at last year's rates. These contracts are supposed to have expired partly on the first of June and partly at the end of the month. It is for this reason, and also because the water rates are somewhat lower than at first, that the proportion and amount forwarded by rail is less recently than earlier in the season. For the past three weeks this year the railroads carried but 30 per cent. of the total forwarded, against 46 per cent. for the six weeks preceding.

The diversion of the grain to the lake and canal route naturally is accompanied by an increase in the proportion of receipts at New York, the terminus of the water route. For the nine weeks since navigation opened the distribution of grain receipts at the different ports has been:

	1877. Bushels.	1877. P. c.	1876. Bushels.	1876. P. c.
New York	9,447,830	38.8	16,738,687	44.6
Boston	1,945,619	8.0	2,796,394	8.0
Portland	177,464	0.7	478,425	1.3
Montreal	1,935,578	7 9	2,803,894	8.0
Philadelphia	3,367,590	13.8	8,029,200	21.4
Baltimore	5,641,590	23.2	5,437,175	14.5
New Orleans	1,836,812	7.6	1,240,230	3.2
Total, nine weeks	24,352,483	100.0	37,524,005	100.0

The proportion received at New York for the nine weeks since April 14 have been 30.8, 29.5, 32.8, 29.6, 37.9, 45.4, 47.0, 49.4 and 39.2 per cent., respectively. The total weekly receipts meanwhile have increased rather than decreased, though for the last week reported they were extremely small. The decrease in the proportion received at Baltimore and Philadelphia is much larger than the increase at New York, as Montreal has become an important receiver recently. Before navigation opened, this year, Baltimore and Philadelphia together had received 47 per cent. of the total seaboard grain receipts. For the past four weeks they have never exceeded 31 per cent.

While the movement is so light, it is likely to be chiefly for domestic supply, and this has a greater effect on its distribution than even the relative cost of carriage by rail and water.

Record of New Railroad Construction.

This number of the *Railroad Gazette* has information of the laying of track on new railroads as follows:

Indianapolis & Springfield.—The first track is laid from Rockville, Ind., to Coloma, 4 miles.

Colorado Central.—On the extension of the *Floyd Hill Branch* track is laid from Floyd Hill, Col., west 8 miles. It is of 3 ft. gauge.

This is a total of 12 miles of new railroad, making 595 miles completed in the United States in 1877, against 656 miles reported for the corresponding period in 1876, 396 in 1875, 603 in 1874, and 1,387 in 1873.

THE FRESH MEAT EXPORT, which has been so important a traffic for a year past, and promised to become an important addition to the business of the country, has suddenly dwindled to very small proportions. Of seven steamers which sailed from New York last Saturday, only one took dressed meat. This seems extraordinary, considering the course of the business heretofore. The most striking thing about it had been its rapid increase. Nearly every month there was a large increase over the shipments of the previous month, and this was evidence enough that the business had been successful—that there was a demand for the meat and a profit in supplying the demand. The explanation usually given of the cessation of exports is that meat is higher in this country and lower abroad than it has been. But perhaps another more complete explanation is the statement made by shippers that the weather has been very hot in England recently. That is, it is quite possible that the export business, which was a great success in fall, winter and spring, is a failure in summer. We must remember that the business is not yet a year old—that is, that shipments on a large scale were not made till last fall. If it shall prove to be impracticable to ship in the summer, however, that may not materially reduce the total exports or the future growth of the business. Should England take one-fourth of its supply from this country, it could just about as well be provided within eight months of the year, as then the larger part of the home supply would be kept for summer consumption. Another influence which may affect the traffic and tend to diminish American exports is the application of the refrigerator system to meats from Continental countries, whether shipped by car or vessel. There is an almost unlimited grazing ground in Russia, whence Europe could be fully and cheaply supplied if the freights were low enough. It would hardly have any advantage over America, however, as the Black Sea is further from Liverpool (by sea) than New York is, and to reach the grazing grounds by rail would be very costly at current European rail rates. There remains hope that the business may grow in this country, and give a use for a vast territory fit for grazing and for very little else which otherwise might not find a market for its cattle.

WATER RATES have been at their lowest. The lake rates fell within two weeks from 2 cents to 1¼ per bushel for corn from Chicago to Buffalo. Canal rates remained about the same—4¼ cents lower for corn from Buffalo to New York—but ocean rates fell materially within a month, and last week were about as low as they ever are, which is not usually the case when lake rates are very low. For some time 4d. per bushel by steam from New York to Liverpool was the commonest quotation. There never was a time when the cost of carrying from the Northwest to Liverpool was so low. Aside from the elevator charges at Buffalo and other port charges at New York, 14¼ cents per bushel covered the whole expense between Chicago and Liverpool. Last year when lake rates were equally low and canal rates a cent or more higher, the ocean rates were nearly twice as high. These low prices were not caused by low prices of grain, requiring low freight rates to cause it to move, as is sometimes the case, but by an absolute want of grain to forward. Prices are quite satisfactory, but the crops have been pretty nearly marketed, and the shipments from the Northwest and the arrivals at the sea-board are exceptionally light—not half as great as last year (when the movement was extraordinarily heavy, however), and as light as the very light movement of 1875. The low figures named came to an end by the end of last week, and there has since been a slight improvement in lake and canal rates and a considerable one in ocean rates, 1¾ cents for corn from Chicago to Buffalo, 4¼ by canal from Buffalo to New York, and 5d. from New York to Liverpool being recent rates. Probably no improvement can be hoped for until after harvest. If there is a heavy crop, of which there is now a fair prospect, and prices continue high, then a heavy movement may set in next September which will be likely to cause quite an advance in freights.

THE ROCK ISLAND REPORT for the last fiscal year has, what has been lacking heretofore, a full history of the company and of the relation which it bears to its several leased lines. These lines form about one-third of the total mileage worked by it, so that it was important to know their position. It appears that the company is substantially the proprietor of all the road it works except the 47 miles of the Peoria & Bureau Valley, for which it pays a fixed rental of $125,000 per year. It owns all the stock, or all but a few shares, of the new Iowa Southern & Missouri Northern Railroad Company, which has nearly completed the purchase of the Chicago & Southwestern, the Des Moines, Indianola & Missouri and the Des Moines, Winterset & Southwestern railroads. The Rock Island Company is the guarantor of the bonds of the Chicago & Southwestern and the owner of the bonds of the other two roads. It is thus substantially the owner; and its capital account, together with the bonds of the Chicago & Southwestern, represents the entire 1,003 miles of road worked by the company, besides some $4,000,000 of its own stock and a considerable amount of the securities of other companies and debts due, though much of the latter is uncollectable—such as the advances to the Chicago & Southwestern.

The report gives no further information of the operation of the Chicago & Southwestern other than the statement that the "advances" to that company increased about $400,000 during the year, indicating that there has been a loss in working it. The acquisition of this road in fee simple, therefore, seems not likely to strengthen the position of the road; but on the other hand it puts it under no new obligations. It remains the guarantor of the Southwestern bonds as heretofore, and that is all. The report shows a quite favorable result of the year's operations, there being a surplus after paying the usual 8 per cent. dividend belonging to the year, besides a 2 per cent. dividend which happened to fall within the year in changing from half-yearly to quarterly dividends. The interesting history of the company which prefaces the report we hope to publish hereafter.

THE IOWA RAILROAD LAW is decided to be constitutional by the United States Supreme Court in a suit which the Chicago, Burlington & Quincy appealed from the State court. This result seemed inevitable after the decision in the Munn & Scott case, and simply affirms the position that a State may regulate rates at will when it has not contracted otherwise in the charters which it has given. It is noticeable that the court in its decision expressly excepts from the rule of subjection to State regulation those roads which have charters permitting them to fix their own rates. The language is: "They are, therefore, engaged in a public employment affecting the public interest, and, under the decision in Munn & Scott *vs.* the People, just announced, subject to legislative control as to their rates of fare and freight, *unless protected by their charters.*"

The italics are ours, and intimate unmistakably what the decision of the Court will be in cases where legislatures have assumed to regulate rates of companies whose charters gave them the right to fix their own rates—a right which, by the common law, permits them only to exact "reasonable rates."

MAY EARNINGS are reported in our table for 26 railroads, with about 17 per cent. of the total mileage in operation in the United States—too small a proportion to justify a general conclusion as to the course of railroad business in the country. Twelve of the 26 lines reporting show a decrease in earnings and fourteen an increase. In the aggregate, with 4.8 per cent. greater mileage they had 7.8 smaller earnings, and their earnings per mile of road fell from $566 to $498, or 11⅘ per cent.

For the five months ending with May we have reports from 25 roads—the same as those in the May list with the exception of the Lehigh Valley. There has been a decrease of 4.9 per cent. in the total earnings of these 25 roads, and of 9.4 per cent. in their earnings per mile, the latter having fallen from $2,401 to $2,175. Last year our table, including 20 of the same roads, showed an *increase* in earnings per mile of 8.4 per cent. for the five months, so that the returns for 1877 indicate a return substantially to the position of 1875.

NEW PUBLICATIONS.

Rand, McNally & Co.'s Business Atlas.—This can hardly be called an elegant work, but it is an extremely convenient one, and well deserves its name as a "business atlas." It is of convenient size (11×14 in.) to be grasped and moved with one hand without leaving one's seat or desk, and is made more convenient for reference when desiring to find a given place than any other work of the kind we have ever seen. This is done substantially in the same way as on many ancient atlases by indexing places by their latitude and longitude. In the "Business Atlas," however, figures for latitude and longitude are not given, but at the top and bottom of the map figures are placed in order about half an inch apart from left to right, and on the right and left sides letters from A to Z at similar intervals. Each map has an index to itself, and each place indexed has a letter and a figure suffixed, the letter indicating that the place is on or near the horizontal line drawn through that letter on the map, and the figure that the place is under that figure. Any one who has had occasion to look up obscure places on a crowded map, with no other clew than the name of the town and the State, will appreciate this feature.

The maps are on two scales: New England and the Middle States about 17½ miles to the inch, and the other states about 28 miles to the inch. The small maps are pretty closely crowded, and it seems hardly appropriate to present thickly-peopled Ohio, Indiana and Illinois on a smaller scale than the Maine wilderness; but there are, of course, advantages, in having all New England on the same scale, and the larger one was indispensable for Massachusetts, Connecticut and Rhode Island. The whole of a state is given together, and when this makes the map too large for a page or a double page, a folded sheet backed with muslin is introduced. This is done for New York and Texas, each of which occupies a space equal to four pages.

By a modification of the index, the maps are made to locate many places not shown on their face. These places are indexed with the statement following that it is so many miles in such a direction from some other place whose index number and letter are there given.

Prefacing the index to each map is given an index to the railroads of the map, and under the name of each road are the names of the places between which the main line and every branch run, the places being there indexed. With the name of the railroad is given the name of the express lines which run over it. Another good feature of the indexes is the statement of population given with the name of each town.

Preceding the maps is given a list of the railroads of the United States and Canada, "including, also, the old names of roads, with references to the present name, corporation or consolidation of which they now form a part or whole, and under which they are officially known," and this again is a feature which railroad men and other business men will value.

The maps are not very handsome, but they are clear, being printed from some kind of relief plate which makes an impression like an electrotype, and the names are not obscured by color, as is too often the case with maps. The only color used is to indicate the borders of counties and states.

This atlas will be especially convenient to railroad men, as it gives the information which they most need, and makes it easily attainable. Many neglect entirely to consult a map, because they anticipate too great a loss of time in looking up what they want. With this book there is very little temptation to such negligence.

The publishers are Rand, McNally & Co., of Chicago.

The Financial Review for the current year published by the *Commercial and Financial Chronicle* appeared some months ago, as should have been noted at the time. It has the usual information—a review of the business of 1876, banking statistics, import and export, and other trade statistics (including prices of merchandise for 1860, 1866 and the four years from 1873 to 1876; useful tables for investors, prices of United States and State securities from 1860 to the end of 1876, and of railroad stocks and bonds for *each month* (highest and lowest) for four years, and quite full cotton statistics. It is an extremely convenient compilation.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

Vermont Valley.—At the annual meeting in Brattleboro, Vt., June 20, the following directors were chosen: Frederick Billings, Daniel L. Harris, G. Morris, F. A. Nash, H. C. Robinson, W. H. Rockwell, S. M. Waite.

Canton Co.—The new board has elected the following officers: Walter B. Brooks, President; George S. Brown, Vice-President; Wm. W. Janney, Secretary and Treasurer.

Rome & Clinton.—At the annual meeting in Rome, N. Y., June 20, the following directors were chosen: E. B. Armstrong, B. J. Beach, Z. Hill, A. Etheridge, George B. Phelps, Lewis H. Shattuck, William S. Bartlett, O. S. Williams, A. W. Mills, J. E. Elliott, Anthony Peck, James I. Scollard, E. H. Shelley. The board elected officers as follows: President, William S. Bartlett; Vice-President, E. B. Armstrong; Secretary and Treasurer, A. W. Mills.

East Tennessee, Virginia & Georgia.—Mr. T. S. Devant is appointed Assistant General Freight and Passenger Agent.

Mr. John T. O'Brien is appointed Assistant to the Vice-President and General Superintendent, in place of N. Bogart, resigned.

St. Paul & Pacific.—At the annual meeting of the First Division Company in St. Paul, Minn., June 12, the following directors were chosen: George L. Becker, H. R. Bigelow, Thos. B. Campbell, Charles E. Flandrau, Edwin C. Litchfield, Edward H. Litchfield, Dwight Woodbury. The board elected George L. Becker President; S. S. Breed, Secretary; Edward H. Litchfield, Treasurer.

Connecticut Central.—Mr. T. M. Maltbie, of Hartford, Conn., has been chosen Secretary and Treasurer, in place of John W. Stoughton, resigned.

Laclede & Fort Scott.—At the annual meeting in St. Louis, June 18, the following directors were chosen: A. C. Mitchell, W. H. Scanlan, I. I. Sately, R. D. Lender, G. H. Hoodless, C. W. Colehour, Geo. A. Fitch.

Chicago, Pekin & Southwestern.—The Illinois Circuit Court has appointed F. E. Hinckley (President of the company) Receiver. He has reappointed all the officers of the road.

Railroad Purchasing Agents' Association.—At the annual convention in Cleveland, O., June 20, the following officers were chosen: President, A. C. Armstrong, Lake Shore & Michigan Southern; First Vice-President, Allan Bourn, Michigan Central; Second Vice-President, E. W. Porter, Canada Southern; Secretary and Treasurer, A. G. Thompson, St. Louis & Southeastern; Executive Committee, G. C. Breed, Louisville & Nashville; J. H. Carpenter, Chicago & Northwestern; A. H. Campbell, Missouri River, Fort Scott & Gulf; A. D. Clarke, Union Pacific, and J. H. Holway, Atlantic & Great Western.

Michigan Central.—At the annual meeting in Detroit, June 25, the following directors were chosen: Moses Taylor, Samuel Sloan, John Jacob Astor, George F. Talman, Isaac Bell, Rosewell G. Rolston, New York; Edward Austin, Nathaniel Thayer, Boston; John N. Barron, Concord, N. H. The only new directors are Messrs. Austin and Barron, who replace August Belmont, of New York, and Frederick Billings, of Woodstock, Vt. There was no opposition, the parties who attempted to oust the old management having withdrawn from the contest before the meeting and placed their proxies in the hands of Moses Taylor, the representative of the old management. The directors chosen received 107,772 votes, the whole number cast; 79,610 shares were not voted.

Pittsburgh, Fort Wayne & Chicago.—Mr. George Parkin has been appointed Master Mechanic of the Eastern Division, in place of S. M. Cummings, resigned. Mr. Parkin has been in the service of the company for a number of years, having been foreman at Allegheny City, then in charge of the Erie & Pittsburgh shops at Erie, and more recently in charge of the shops at Crestline, O.

Master Car-Builders' Association.—The officers for the ensuing year are: President, Leander Garey, New York Central & Hudson River; Vice-President, M. P. Ford, Pittsburgh, Cincinnati & St. Louis; Secretary, C. A. Smith, New York; Treasurer, B. K. Verbryck, Chicago, Rock Island & Pacific. The only change is the choice of Mr. Verbryck as Treasurer, in place of Aaron Steinbach, deceased.

Wabash.—Mr. H. L. Hall has been appointed General Southwestern Passenger Agent, with office in St. Louis; Mr. W. R. Crumpton, General Northwestern Passenger Agent, with office in Keokuk, Ia.; Mr. C. Sheehy, Northern Passenger Agent, with office in Detroit. The first two take the place of J. S. Lazarus, late General Western Agent.

Memphis & Charleston.—Capt. John A. Grant has been appointed Chief Engineer and General Superintendent. He was lately in charge of the Macon & Brunswick road.

Chippewa Falls & Northeastern.—At the annual meeting in Chippewa Falls, Wis., June 9, the following directors were chosen: H. S. Allen, George C. Ginty, H. C. McRae, Robert Mariner, L. F. Martin, Thomas Phillips, A. E. Pound, Thad. C. Pound, E. Poznanski, Thomas E. Randall, D. E. Seymour, L. C. Stanley. The board elected Thad. C. Pound President; L. C. Stanley, Vice-President; H. C. McRae, Secretary; D. E. Seymour, Treasurer.

PERSONAL.

—Mr. J. S. Lazarus has resigned his position as General Western Passenger Agent of the Wabash Railway.

—Mr. Newton Bogart, for several years past Assistant to the General Superintendent of the East Tennessee, Virginia & Georgia Railroad, has resigned his position on account of ill-health.

—Mr. John Latham, formerly Master Mechanic in charge of the Erie shops at Hornellsville, N. Y., died in that city June 17. He entered the shops in 1855, and gradually rose to be Master Mechanic, which position he held until forced to resign several years ago on account of spinal disease, from which he died.

—It is reported that the position of Superintendent or General Manager of the Cincinnati Southern has been offered to Gen. Wm. McRae, now Superintendent of the Western & Atlantic.

—James O. Glanville, Freight Collector in Baltimore for the Northern Central and the Empire and Union lines, disappeared last week, and it has since been ascertained that he is a defaulter to the amount of about $2,500.

—Mr. Clark Fisher, late Chief Engineer United States Navy, and now of the manufacturing firm of Fisher & Norris, Trenton, N. J., sailed for Europe last Saturday on the Amerique.

—Prof. W. P. Trowbridge, for some time past Professor of Dynamical Engineering in the Sheffield Scientific School of Yale College, has accepted the appointment of Professor of Civil Engineering in Columbia College. Prof. A. Jay Dubois, of the Lehigh University, formerly an instructor in the Sheffield School, has been chosen to succeed Prof. Trowbridge.

TRAFFIC AND EARNINGS.

Delaware Fruit Traffic.

The Philadelphia, Wilmington & Baltimore has made the following offer, which is a final one, to the peach growers of Delaware and the Eastern Shore: Rates to Jersey City and Boston to be reduced $5 per car from those of 1875; empty baskets to be returned at one cent each from Jersey City. On Western shipments, to points reached by the Pennsylvania Railroad and Baltimore & Ohio Railroad, west of and including Pittsburgh and Wheeling a reduction of 30 per cent. from the rates in force in 1875 to be made, and rates to be named to all principal points, empty baskets to be returned as follows: For a distance less than 100 miles, 1 cent per basket; for a distance of 100 to 199 miles, 2 cents per basket; for a distance of 200 to 499 miles, 3 cents per basket; for a distance of 500 to 1,000 miles, 4 cents per basket. It is understood that the chartered-car system heretofore in force will be abandoned, and that the basis of calculation will be for car-loads of 16,000 pounds.

This was submitted to a convention held at Middletown, Del., June 22, and was not well received, a greater reduction and the continuance of the chartered-car system being wanted, and the charge for returning baskets objected to.

Railroad Earnings.

Earnings for various periods are reported as follows:

	1877.	1876.	Inc. or Dec.	P. c.
Five months ending May 31:				
Bur., Cedar Rapids & Northern	$359,292	$488,445	Dec.. $129,153	26.4
Net earnings	76,367	133,458	Dec.. 57,091	42.8
Per cent. of expe...	78.74	72.74	Inc .. 6.00	8.2
New Jersey Mid and.	250,113	229,884	Inc .. 20,229	8.8
Net earnings	57,544	.....	.....	....
Per cent. of exps..	76.99	.....	.....	....
Philadelphia & Erie..	1,139,158	1,304,456	Dec.. 165,298	12.7
Net earnings	320,456	400,041	Dec.. 79,585	19.9
Per cent. of exps...	71.82	69.33	Inc .. 2.49	3.6
Four months ending April 30:				
Denver & Rio Grande.	$180,582	.....	.....	....
Net earnings	77,773	.....	.....	....
Per cent. of exps...	56.92	.....	.....	....
Month of May:				
Intercolonial	$112,695	$79,183	Inc .. $33,512	42.3
Second week in June:				
Atchison, Topeka & Santa Fe	$39,949	$51,844	Dec.. $11,895	22.9
Denver & Rio Grande.	12,241	.....	.....	....
St. Louis, Iron Mt. & Southern	82,800	66,962	Inc .. 15,838	23.6
Week ending June 16:				
Grand Trunk	$151,184	$169,475	Dec.. $18,291	10.8

The Atchison, Topeka & Santa Fe reports interruption of traffic by excessive floods as the cause of the large decrease in earnings.

Freight Rates.

The trouble as to the cutting of freight rates from St. Louis eastward was settled at a meeting held in New York June 21, when the Wabash Company consented to charge local rates from St. Louis to Toledo. It is thought, however, that this agreement is not permanent, but that the Wabash will begin cutting again, if its St. Louis business falls off seriously.

Grain Movement.

For the week ending June 9, receipts and shipments of grain of all kinds were as follows, in bushels:

	1877.	1876.	Decrease.	P. c.
Lake ports' receipts	2,215,000	6,094,854	3,879,854	59.6
" " shipments	2,783,325	5,042,385	2,259,060	44.8
Atlantic ports' receipts	3,294,502	4,973,426	1,678,924	33.7

Of the total lake ports' shipments, 28 per cent. went by rail this year, against 35 per cent. in 1876, 32 per cent. in 1875 and 27¾ per cent. in 1874.

For the week ending June 16 these figures were:

	1877.	1876	Decrease.	P. c.
Lake ports' receipts	2,076,791	5,991,926	3,915,135	65.3
" " shipments	2,166,457	5,313,216	3,146,759	59.2
Atlantic ports' receipts	1,657,278	5,123,251	3,465,973	67.6

Of the shipments from lake ports, 30½ per cent. were by rail this year, 45 in 1876, 43 in 1875, and 18 in 1874.

The percentage received at each Atlantic port for the two weeks was:

	Week ending— June 9.	June 16.
New York	49.4	39.2
Boston	5.8	10.2
Portland	0 1	0.1
Montreal	14.5	18.4
Philadelphia	8.2	9.3
Baltimore	15.8	17.4
New Orleans	6.2	5.4
Total	100.0	100.0

Coal Movement.

Coal tonnages for the week ending June 16 were:

	1877.	1876.	Inc or Dec.	P. c.
Anthracite	481,622	406,888	Inc .. 74,734	18.4
Semi-bituminous	72,132	69,465	Inc .. 2,667	3.8
Bituminous, Pennsylvania.	30,810	41,591	Dec.. 10,781	25.9

The anthracite production still continues large, although prices are lower than ever.

ANNUAL REPORTS.

Chicago, Rock Island & Pacific.

The property worked by this company for the year ending March 31 was as follows:

	Miles.
Main Line, Chicago, Ill., to Council Bluffs, Ia	500.25
Oskaloosa Branch, Wilton, Ia., to Knoxville	128.00
South Chicago Branch	9.00
Total owned	637.25
Peoria & Bureau Valley R. R., Bureau Junction, Ill., to Peoria	46.75
Des Moines, Indianola & Missouri, Des Moines, Ia., to Winterset	22.00
Des Moines Winterset & Southwestern, Summerset, Ia., to Winterset	26.00
Chicago & Southwestern, Washington, Ia., to Leavenworth, Kan	271.00
Total leased	365.75
Total worked	1,003.00

The Chicago & Southwestern is not included in the statements made in the report, which covers 732 miles of road. This road was lately sold under foreclosure and bought by a company known as the Iowa Southern & Missouri Northern, organized in the interest of the Chicago, Rock Island & Pacific. The same company is expected to purchase the Des Moines, Indianola & Missouri and the Des Moines, Winterset & Southwestern, against which foreclosure suits have been brought by the lessee, which holds all the bonds of both companies. The Oskaloosa Branch was extended from Oskaloosa to Knoxville, 24.75 miles, during the year, the extension being opened for traffic in November.

The equipment consists of 229 engines; 12 sleeping, 75 passenger, 26 baggage and express and 6 postal cars; 2,514 box, 672 stock, 979 platform and coal and 90 caboose and drovers' cars; 1 officers', 1 paymaster's and 2 repair cars. It was increased during the year by 2 baggage, 4 box and 5 caboose cars; 4 engines and 60 freight cars were built to replace old ones worn out.

The credit side of the capital account was as follows at the close of the year:

Capital stock	$24,999,800 00
Fractional scrip convertible into stock	200 00
Total stock ($39,231 per mile)	$25,000,000 00
Mortgage sinking fund bonds	9,000,000 00
Six per cent. income bonds	1,000,000 00
Fractional agreements convertible into bonds	100 00
Total bonds ($15,693 per mile)	$10,000,100 00
Chicago, Rock Island & Pacific Co. of Iowa	3,448 56
Suspense account	3,088 88
Income bond sinking fund	164 38
Profit; balance of income account	8,187,534 02
Total	$43,194,335 84

The company holds $4,020,000 of its own stock; $125,000 stock and $389,371.54 bonds of the Pacific Hotel; bonds of connecting and other roads valued at $283,164 95, and has claims against the Chicago & Southwestern for $1,969,712.49 advanced to pay coupons and $1,716,543.88 for other purposes, $3,686,256.37 in all. This debt of the Southwestern increased $400,108.59 during the year.

The commissioners of the sinking fund report receipts of $160,000 from land sales and $57,116.11 from interest, and the purchase of $220,000 bonds at a cost of $231,363.71, leaving a cash balance of $14,162.51 at the close of the year.

The Land Department reports sales of 21 532 acres for $178,595 57. Interest received on time contracts was $62,773.07. Bills receivable increased from $803,276.08 to $823,950.32. Taxes were paid on 333,262 acres owned by the company.

The work done during the year was as follows:

	1876–77.	1875–76.	Inc or Dec.	P. c.
Pass. train mileage	984,406	1,019,730	Dec.. 35,324	3.5
Freight train mileage	3,406,079	3,587,196	Dec.. 181,117	5.0
Service train mileage	406,435	375,525	Inc .. 30,910	8.2
Total	4,796,920	4 982,451	Dec.. 185,521	3.7
Locomotive mileage	6,288,951	6,960,139	Dec.. 671,188	9.6
Passengers carried	1,455,366	1,406,433	Inc .. 48,933	3.5
Passenger mileage	60,634,585	59,393,515	Inc .. 1,241,070	2.1
Tons freight carried	1,651,408	1,640,000	Inc .. 11,408	0.7
Tonnage mileage	276,199,164	267,511,380	Inc .. 8,687,784	3.2
Average pass. train load, No.	61.50	58.25	Inc .. 3.25	5.6
Av. freight train load, tons	81.09	74 57	Inc .. 6.52	8.7
Av. tons per loaded car	7.99	.....	.....	....
Earn. per pass. train mile	$1 80	$1 73	Inc .. $0 07	4.0
Earn. per freight train mile	1.3820	1.4207	Dec .. 0.0387	2.7
Earn. per pass. per mile	2.923 cts.	2.970 cts.	Dec.. 0.047 ct.	1.6
Earn. per ton per mile	1.710 "	1.910 "	Dec.. 0.200 "	1.0
Cost per ton or per pass. per mile	1.050 "	1.050 "	.....	....

The cost of locomotive service per mile run was 18.22 cents against 18.61 cents the previous year. The tonnage mileage given is of paying freight; the total tonnage mileage for the year was 291,063,426, against 288,525,696 the preceding year.

The earnings for the year were as follows:

	1876–77.	1875–76.	Inc. or Dec.	P. c.
Passengers	$1,772,513 46	$1,763,900 58	Inc .. $8,612 88	0.5
Freight	4,708,146 22	5,121,556 64	Dec.. 413,410 42	8.1
Mail	141,444 92	164,645 82	Dec.. 23,200 90	14.1
Express	94,039 18	94,300 31	Dec .. 261 13	0.3
Rents, interest, etc	159,585 33	161,045 95	Dec.. 1,460 62	0.9
Use of cars	34,951 30	29,248 27	Inc .. 5,703 02	19.5
Telegraph line	6,976 21	7,492 40	Dec.. 516 19	6.9
Total	$6,917,656 62	$7,342,189 97	Dec..$424,533 35	5.8
Work'g expenses	3,296,155 48	3,408,901 77	Dec.. 112,746 29	3 3
Legal expenses	27,291 19	28,872 49	Dec.. 1,581 30	5.4
Taxes	209,747 41	217,387 08	Dec.. 7,639 67	3.5
Total	$3,533,194 08	$3,655,161 34	Dec..$121,967 26	3.3
Net earnings	$3,384,462 54	$3,687,028 63	Dec..$302,566 09	8.2
Gross earnings per mile	9,784 52	10,845 20	Dec.. 1,060 68	9.8
Net earnings per mile	4,787 57	5,445 20	Dec.. 657 63	12.1
Per cent. working expenses	47.65	46.43	Inc .. 1.22	2.6
Per ct. all exp's	51.07	49.78	Inc .. 1.29	2.6

The disposition of the net earnings was as follows:

Net earnings		$3,384,462 54
Dividends (April 4, October 4, February 2 per cent.)	$2,097,980	
Interest on bonds	690,000	
Income bonds sinking fund	40,000	
Rent, Peoria & Bureau Valley R. R.	125,000	
		2,952,980 00
Surplus for the year		$431,482 54
Balance of income account, April 1, 1876		7,756,051 48
Balance, April 1, 1877		$8,187,534 02

An extra dividend of 2 per cent. was paid, owing to the change from half-yearly to quarterly dividend periods.

The working expenses for the year in detail were:

Salaries of agents and clerks	$300,303 90
Books, printing and stationery	34,734 39
Station house expenses	64,295 38
Labor of handling freight, watchmen, etc	297,143 56
Conductors, baggagemen and brakemen	221,844 01
Enginemen, firemen and wipers	325,807 54
Fuel account	378,632 24
Oil, tallow and waste	49,717 69
Loss and damage of goods and baggage	14,089 47
Gratuities for injuries to persons	7,092 00
Repairs of engines and tenders	225,883 29
Repairs of cars	283,889 86
Tools and machinery in shops	11 788 57
Repairs of roadway and track	523,470 72
Cost of iron and steel for repairs and renewal of rails	346,382 99
Repairs of fences and gates	12,118 12
Repairs of bridges and draws	59,414 05
Repairs of buildings and fixtures	66,098 16
Damages for cattle killed or injured	9,743 83
Repairs of telegraph	6,637 48
Car service account	53,017 16
Contingent account	4,051 07
Total	$3,296,155 48

The average number of employes was 4,251, the greatest number employed being 4,655 in September, the least 3,503 in February.

The amount charged to construction and equipment account was $120,757.11 for ordinary betterments and $528,060.43 for extension of the Oskaloosa Branch. During the past eight years the amount added to permanent accounts was $14,804,392.68, of which $3,686,255 was on account of the Chicago & Southwestern, $2,275,631 for construction and control of 127 miles of branches and the balance for improvements of main line and new equipment. During the same period the stock was increased $6,980,000 and the bonded debt $1,197,396.68, the balance being provided from surplus earnings. During this time the passenger mileage increased 93 and the tonnage mileage 140 per cent., while passenger rates decreased 30 and freight rates 40 per cent. The equipment of the road was more than doubled, 60 miles of second track and 57⅛ miles of sidings built, besides many new buildings and bridges and 240 miles of steel rails were laid.

During the past year 10,200 tons of steel rails and 178,552 new ties were used in renewals; 33,181 rails were taken up and repaired for use in sidings. Extensive repairs were made to the equipment and the road-bed and bridges. The change of grade near Homestead was completed and similar improvements begun at two other points. A new double track combination bridge was built over Fox River.

The small increase of tonnage was due to partial failure of crops and the loss of hogs by disease, the Oskaloosa Branch being especially affected by these causes. The decrease in freight rates resulted from the working of the Iowa law; that in passenger rates chiefly from special rates made on Centennial business. There was also a decrease in the rates received for mail service.

Accompanying the report is a history of the various lines worked by the company, which is of much interest, but which want of space prevents us from publishing this week.

RAILROAD EARNINGS IN MAY.

Name of Road.	Mileage. 1877.	1876.	Inc.	Dec.	Per c.	Earnings. 1877.	1876.	Increase.	Decrease.	Per c.	Earnings per Mile. 1877.	1876.
Atchison, Topeka & Santa Fe	711	711	.....	.....	.....	$183,322	$212,083	.....	$28,761	13.6	$258	$298
Burlington, Cedar Rapids & Northern	401	401	.....	.....	.....	71,606	100,902	.....	29,296	29.0	179	252
Cairo & St. Louis	146	146	.....	.....	.....	23,333	23,208	125	.....	0.5	160	159
Canada Southern	452	452	.....	.....	.....	149,312	123,087	26,225	.....	21.3	330	272
Central Pacific	1,634	1,315	319	.....	24.3	1,575,000	1,757,415	.....	182,415	10.4	964	1,336
Chicago & Alton	679	650	29	....	4.5	321,256	423,645	.....	102.389	24.2	473	652
Chicago, Milwaukee & St. Paul	1,402	1,400	2	.....	0.1	606,000	819,562	.....	213,562	26.1	4 2	585
Cleveland, Mt. Vernon & Delaware	157	157	.....	.....	.....	35,868	32,858	3,010	.....	9.1	228	209
Denver & Rio Grande	269	120	149	.....	124 2	65,436	34,864	30,572	.....	87.6	243	291
Illinois Central, Illinois lines	707	707	.....	.....	.....	358 905	471,595	.....	112,690	23.9	508	667
Indianapolis, Bloomington & Western	344	344	.....	.....	.....	107,309	130,585	.....	23,276	17.8	312	380
International & Great Northern	516	459	57	.....	12.4	81,822	70,606	11,216	.....	16.0	159	154
Lehigh Valley	292	292	.....	.....	.....	586,000	515,754	70,246	.....	13.6	2,007	1,766
Louisville & Nashville	967	921	46	.....	5.0	382,574	360,342	22,232	.....	6.2	396	391
Missouri, Kansas & Texas	786	786	.....	.....	.....	231,307	212,928	18,379	.....	8.6	294	271
Missouri Pacific	426	426	.....	.....	.....	303,542	264,847	38,695	.....	14.6	713	622
Nashville, Chattanooga & St. Louis	341	341	.....	.....	.....	128,646	143,422	.....	14,776	10.3	377	421
New Jersey Midland	86	86	.....	.....	.....	56,465	52,073	4,392	.....	8.4	657	605
Philadelphia & Erie	288	288	.....	.....	.....	260,591	298,495	.....	37,904	12.7	.....	.....
St. Louis, Alton & Terre Haute—Belleville Line	71	71	.....	.....	.....	34,950	39,290	.....	4,340	11.0	492	553
St. Louis, Iron Mountain & Southern	685	685	.....	.....	.....	304 000	257 339	46,661	.....	18.1	444	376
St. Louis, Kansas City & Northern	530	519	11	.....	2.1	227,178	237,355	.....	10,177	4.3	429	457
St. Louis & San Francisco	328	328	.....	.....	.....	102,696	99,601	2,495	.....	2.5	311	304
St. Louis & Southeastern	356	356	.....	.....	.....	79,828	87,896	.....	8,068	9.1	224	247
Toledo, Peoria & Warsaw	237	237	.....	.....	.....	85,011	125,209	.....	40,198	32.1	359	528
Wabash	628	628	.....	.....	.....	335,857	365,168	.....	29,311	8.0	535	581
Totals	13,439	12,826	613	.....	.....	$6,697,214	$7,360,139	$274,248	$837,163	.....	$498	$566
Total increase or decrease	.....	.....	613	.....	4.8	.....	.....	.....	562,915	7.8	.....	.....

RAILROAD EARNINGS, FIVE MONTHS ENDING MAY 31.

Name of Road.	Mileage. 1877.	1876.	In.	Dec	Per c.	Earnings. 1877.	1876.	Increase.	Decrease	P.c.	Earnings per mile. 1877.	1876.	Inc.	Dec.	P. c.
Atchison, Topeka & Santa Fe	711	678	33	....	4.9	$844,347	$851,874	.....	$7,527	0.9	$1,187	$1,256	.....	$69	5.5
Burlington, Cedar Rapids & Northern	401	401	....	....	.....	359,292	488,535	.....	129,243	26.5	896	1,218	.....	322	26.5
Cairo & St. Louis	146	146	....	....	.....	103,757	100,082	3,675	.....	3.7	711	685	$26	.....	3.7
Canada Southern	452	452	....	....	.....	736,046	721,873	14,173	.....	2.0	1,628	1,597	31	.....	2.0
Central Pacific	1,634	1,315	319	....	24.3	6,309,000	6,380,676	.....	71,676	1.1	3,861	4,852	.....	991	20.4
Chicago & Alton	679	650	29	....	4.5	1,682,750	1,795,718	.....	112,968	6.3	2,480	2,763	.....	283	10.2
Chicago, Milwaukee & St. Paul	1,402	1,400	2	....	0.1	2,370,460	3,082,733	.....	712,273	23 1	1,691	2,202	.....	511	23.2
Cleveland, Mt. Vernon & Delaw.	157	157	....	....	.....	148,530	150,550	.....	2,020	1.3	946	959	.....	13	1.3
Denver & Rio Grande	269	120	149	....	124.2	248,867	163,253	85,614	.....	52.4	925	1,360	.....	435	32 0
Illinois Central, Illinois lines	707	707	....	....	.....	1,819,255	2,168,883	.....	349,628	16.1	2,573	3,068	.....	495	16 1
Indianapolis, Bloom. & West'n	344	344	....	....	.....	491,306	640,441	.....	146,135	22.8	1,437	1,862	.....	425	22.8
International & Gt. Northern	516	459	57	....	12.4	588,390	501,845	86.545	.....	17.2	1,140	1,093	47	.....	4.3
Louisville & Nashville	962	921	41	....	4.3	2,029,770	1,922,647	107,123	.....	5.6	2,1 0	2 088	22	.....	1.1
Missouri, Kansas & Texas	786	786	....	....	.....	1,172,808	1,184,212	.....	11,404	1.0	1,492	1,507	.....	15	1.0
Missouri Pacific	426	426	....	....	.....	1,484,241	1,448,803	35,438	.....	2.4	3,484	3,401	83	.....	2.4
Nashville, Chattanooga & St. L.	341	341	....	....	.....	693,554	758,074	.....	64,520	8.5	2,034	2,229	.....	195	8.5
New Jersey Midland	86	86	....	....	.....	250,113	229,884	20,229	.....	8.8	2,908	2,675	235	.....	8.8
Philadelphia & Erie	288	288	....	....	.....	1,139,158	1,304,456	.....	165,298	12.7	3,955	4,529	.....	574	12.7
St. Louis, Alton & Terre Haute, Belleville Line	71	71	....	....	.....	202,826	198,242	4,584	.....	2 3	2,857	2,792	65	.....	2.3
St. Louis, Iron Mt. & Southern	685	685	....	....	.....	1,672,291	1,466,743	205,548	.....	14.0	2,441	2,141	300	.....	14.0
St. Louis, Kansas City & North'n	530	519	11	....	2.1	1,240,611	1,273,163	.....	32,552	2.6	2,341	2,453	.....	112	4.6
St. Louis & San Francisco	328	328	....	....	.....	514,764	504,698	10,066	.....	2.0	1,569	1,539	30	.....	2.0
St. Louis & Southeastern	356	356	....	....	.....	408,280	416,985	.....	8,705	2.1	1,147	1,171	.....	24	2.1
Toledo, Peoria & Warsaw	237	237	....	....	.....	418,494	557,457	.....	138,963	25.0	1,766	2,352	.....	586	25.0
Wabash	628	628	....	....	.....	1,646,037	1,729,896	.....	83,859	4.8	2,621	2 754	.....	133	4.8
Totals	13,142	12,511	641	....	.....	28,577,947	30,041,723	$572,995	2,036,771	.....	$2,175	$2,401	.....	$226	9.4
Total increase or decrease	.....	.....	641	....	5.1	.....	.....	.....	1,463,776	4.9	.....	.....	.....	.....	.....

THE SCRAP HEAP.

Railroad Manufactures.

The Mason Machine Works, at Taunton, Mass., recently shipped a locomotive for the North Pacific Coast road.

The Boston & Albany Railroad Co. is fitting up some trucks with the Miltmore axle, for the purpose of giving that device a trial.

The Delaware Bridge Co. has a contract for a bridge on the Pennsylvania Railroad, near Rockville, Pa.

It is said that the rolling mill at Alliance, O., will be started up soon.

W. C. Allison & Co., at Philadelphia, are building some narrow-gauge cars to go to South America. They are also altering a number of box cars to refrigerator cars.

Quotations for steel rails at Philadelphia are $46 to $48; iron rails, $33 to $36 per ton, both at the mills.

The Passaic Rolling Mill Co., at Paterson, N. J., is running all the furnaces and every department of its works to their fullest capacity, double turn, on their specialties of shapes of rolled iron and on bridge building. The finished product is about 40 tons per day.

The Birmingham Iron & Steel Works, at Birmingham, Conn., are offered for sale by the assignees, H. B. Bigelow, Charles M. Charnley and Louis H. Bristol, whose address is at New Haven, Conn. The property includes a rolling mill, spring and axle works, office and other buildings, with the necessary steam engines and a valuable water privilege.

The Cleveland (O.) Rolling Mill Co. now employs about 250 men in its sheet and boiler plate mills.

The furnace of the Crown Point (N. Y.) Iron Co. will go out of blast July 1, preparatory to relining and repairing it. The company has about 12,000 tons of Bessemer pig iron on hand.

The Lehigh Car Wheel Works at Catasauqua, Pa., are at work on orders for Brazil. They lately shipped a number of wheels to England.

Mr. Wellington, of Toledo, O., has taken out two patents for casting car wheels from two different qualities of iron, one being used for the tread and flange and the other for the spokes or plate and hub. The two kinds of metal are let into the mould by different channels, in such a way that the iron for the tread is forced out into that part of the mould.

A large number of the puddlers in the iron works of the Lehigh and Schuylkill valleys have struck on account of a proposed reduction of wages.

The Bartow Rolling Mill, near Cartersville, Ga., was destroyed by fire on June 17.

American Rolling Stock in Australia.

Writing from Sydney, under date of April 14, the *Times* correspondent thus refers to the supply of locomotives and carriages from America:

"Our appearance at Philadelphia has drawn the attention of American manufacturers to us in a most marked and unexpected degree. A country that, like New South Wales, is rolling in wealth must be a country that is able to buy, and a country that is able to buy is exactly the country that American manufacturers have been anxiously looking out for. Our representatives in Philadelphia have come back strongly impressed with the fact that there are many things the Americans can supply us with to advantage. Our Government has an offer from Messrs. Baldwin & Co. to furnish a locomotive engine for about £1,000 less than the cost of an English engine, and to leave the payment open until the engine has been thoroughly proved and approved. A Pullman's sleeping car and an ordinary passenger car have already been ordered, and American wheels, axles, rails and brakes are strongly pressed on our acceptance. As our Government engineers are all of the English school, American novelties will have a hard battle to fight to win official acceptance, but the demand for economy in railway construction and working is so great that people and Parliament will press on the Minister for Public Works a fair trial for any American novelties that may seem to be suited to our wants. The English manufacturers, therefore, who have hitherto supplied us must look to their laurels."

An Attempt at Train Robbery.

On the night of June 22 an attempt was made to rob the express car of a train on the Lake Shore & Michigan Southern road, but was prevented by the police of Toledo, who had received information of the intended robbery. Shortly after the train had left Ligonier, Ind., four men, masked and armed, entered the car, seized the express agent and proceeded to bind him, when they were confronted by a force of officers, who at once secured the robbers. They have been held for trial.

First Chinese Railroad.

A correspondent writes us as follows: "I have just returned from a cruise in the Asiatic Station, and I send you a photograph of the first railroad train in China. The engine and cars were sent out from London: track 2 ft. 6 in. gauge.

"The 'Pioneer' that did the construction work has cylinders 4×5 in., driving-wheels 12 in. diameter, and weighs 2,800 pounds. The 'Celestial Empire' and 'Flowery Land' have cylinders 8×10 in., driving-wheels 23 in. diameter, and weigh nine tons each. They haul six cars from Shanghai to Woosung, a distance of twelve miles, in 33 minutes, and make three stops."

The photograph represents a six-wheeled coupled engine with six four-wheeled passenger cars of the European type. The train is crowded with passengers, but all of them are evidently European—only one Chinaman being in sight, and he apparently a laborer.

A Railroad with Heavy Traffic.

The Brandon (Vt.) *News* of recent date says: "We understand that a cow was killed on the track of the Addison County Railroad last week. She was hid in the grass and the engineer could not see her until the engine flattened down the grass."

Tramps.

Even tramps are useful occasionally. The Chester (Ill.) correspondent of the St. Louis *Republican* says: "Last Friday the trestle work on the Iron Mountain, Chester & Eastern Railroad over Cox's Creek, near Steelesville, gave way, and only for the discovery of the break by a tramp that was passing along the ties, a dreadful accident might have occurred. The damage was soon repaired and trains are now running regularly.

Train Wreckers Sentenced.

The St. Louis *Republican* says: "On the 26th of May last two men named Toby Aldridge and John Walker spent an undue portion of their money for bad whiskey in the town of Mt. Vernon, Indiana. On the same night they boarded a train of

the St. Louis & Southeastern Railway at Mt. Vernon and attempted to steal a ride. The conductor declined to be a party to this free travel and put them off. They disliked this proceeding so much that out of sheer spite they attempted to wreck a following train by placing ties across the track. Fortunately the obstructions were discovered by the engineer and no damage resulted. Subsequently the miscreants were arrested and came to trial last Saturday at Mt. Vernon. They pleaded guilty, and without loss of time were fined $250 each and sentenced to the penitentiary for two years. The good work of locking up train wreckers and would-be train wreckers is progressing nobly."

Running a Burning Bridge.

The St. Louis *Republican* tells this story, but is careful not to vouch for its truth:

"On one of the East Indian lines recently a train was approaching a bridge on a curve. When the bridge came within sight, at a distance of 300 to 400 yards, the engine driver was horror-struck to find that it was completely in flames. Finding his brake-power totally useless in the emergency he jumped off, as did also the fireman, just as the train entered upon the burning bridge, over which it rushed, fortunately with unabated speed, through a continuous flame which rose furiously above the height of the railroad cars. The wooden sleepers were on fire and parts of the rails themselves were red hot. The whole train, composed of a number of cars, passed safely over, and not a passenger was injured or scorched."

Born by Rail.

The Port Jervis (N. Y.) *Gazette* of June 5 says: "Last Thursday afternoon, while Erie train No. 8 was running between Lackawaxen and Pond Eddy at the rate of about 25 miles per hour, a youthful passenger came aboard the train, much to the surprise of the conductor and all hands. Being under size and age, as provided for by the company's rules, the little fellow received a free passage to destination."

Raising a Locomotive.

The Albany (N. Y.) *Argus* of recent date says: "The locomotive that went through the draw of the upper railroad bridge a week or so ago, has been raised out of the water. It lay in the water bottom upward. Two pontoons were used, with timbers running across both ends, and the same spread apart, in order to have the timbers come directly over the sunken engine. Chains were then attached to heavy timbers and fastened to the engine. The work of raising was proceeded with until high water Friday evening, when the engine was floated on the beach at East Albany, below the lower railroad bridge. At low tide the slack chain was taken up, and the contractors floated it further ashore at high tide last evening over a set of ways laid for that purpose. To finish the work the contractors propose to use two powerful locomotives to haul her from the beach to the track."

Steam Street Car Trials.

Messrs. McArthur, owners of a street railroad from Dayton, O., to Newport, have ordered two or three steam cars from Philadelphia and expect to put them in use about July 1.

The New York City Council has granted permission to the Third avenue and the Harlem Bridge & Fordham lines to use steam motors on their roads for three months, on trial. This permission is coupled with the requirement that in the cars drawn by steam each passenger shall be furnished with a seat.

OLD AND NEW ROADS.

Foreclosure Sales.

The following sales of railroad property under judicial process are noted:

Jersey City & Albany, at Hackensack, N. J., June 22. Purchased by Delos E. Culver for account of the bondholders. The road is completed from Ridgefield Park, N. J., on the New Jersey Midland, north to Tappantown, N. Y., 12 miles, and partly graded for some miles further. It has only been operated about half the time since its completion to Tappantown in 1873. The purchasers will pay $1,000 cash and the balance in bonds. This sale included only the property in New Jersey; the property in New York, including about half a mile of finished road and the grading, right of way, etc., on the extension to Haverstraw, will be sold shortly.

The sale of the *New York & Oswego Midland* has been postponed to Jan. 4, 1878, by order of the United States Circuit Court. By that time it is expected that a decision will have been secured from the Supreme Court on the question of the prior lien of the Receiver's debts and certificates.

Dividends.

Dividends have been declared as follows:

Chicago, Rock Island & Pacific, 2 per cent., quarterly, payable Aug. 1.

Chicago, Iowa & Nebraska (leased to Chicago & Northwestern), 5 per cent., payable July 2.

Norwich & Worcester, 5 per cent., semi-annual, payable July 5.

Old Colony, 3 per cent., semi-annual, payable July 2.

United New Jersey, 2¼ per cent., quarterly, payable July 10.

The Cincinnati, Sandusky & Cleveland announces the payment of the preferred stock dividend which was due May 1.

St. Louis, Lawrence & Western.

Notice is given that in the suit of W. D. Griswold and D. Deming against this company the United States Marshal for the District of Kansas will sell at Lawrence, Kan., July 23, the equipment and personal property of this company, consisting of 2 locomotives, 1 passenger, 1 baggage, 30 coal, 4 hand, 3 push and 2 iron cars, and sundry railroad supplies.

Long Island.

The new track through Atlantic avenue in Brooklyn has been fully completed and made ready for use. A temporary depot has been fitted up at Flatbush and Atlantic avenues, and passenger trains began to run from that point on June 28.

Macon & Brunswick.

Under the law passed by the Georgia Legislature the State Treasurer has already exchanged new 6 per cent. State bonds to the amount of $2,130,000 for the company's 7 per cent. bonds indorsed by the State, leaving only $158,000 of the indorsed bonds outstanding.

Lake Shore & Michigan Southern.

A Washington dispatch says that the counsel for this company have concluded an amicable agreement with the Commissioner of Internal Revenue, under which the claims of the Government against the company for taxes on net earnings will be settled without further litigation.

Northeastern, of Georgia.

The Governor of Georgia having refused to put the State endorsement on the bonds of this company, as provided for by the Legislature, the company has filed a bill in chancery to determine its rights in the matter, and, if successful, to require the Governor to comply with the law.

Brazos & Colorado.

A company by this name has been organized to build a narrow-gauge road from Columbia, Tex., the terminus of the Columbia Division of the International & Great Northern, northwest to Wharton on the Colorado River. The distance is about 40 miles.

Union Pacific.

The Cheyenne *Leader* says that at a recent interview in that town with Messrs. Dillon and Gould, the former stated that the Black Hills Branch would start from the Union Pacific at Pine Bluffs, 43 miles east of Cheyenne, the line from that place being the best surveyed. He further stated that it was very uncertain whether any work at all would be done this season.

Troy & Montgomery.

It is proposed to build a railroad from Troy, Ala., the terminus of the Mobile & Girard road, north by west to Montgomery, about 45 miles.

Mt. Airy & Central.

Work on this road was begun at Mt. Airy, N. C., June 20. It is to run from Mt. Airy, in Surry County, southwest to Greensboro, 66⅛ miles, and is to be of 3 ft. gauge.

Central, of New Jersey.

The agreement between the Receiver and the Lehigh Coal & Navigation Company has been concluded. It provides for the payment by the Central of $400,000 on account of rental heretofore due and for the payment of all rentals accruing on the Lehigh & Susquehanna Railroad and the canals monthly hereafter. The balance of rentals overdue and also certain sums due on account of the Lehigh & Wilkesbarre Coal Company, are to be credited to the Navigation Company on the account due for new construction and improvements.

It is stated that the stockholders' committee will shortly submit a plan for the reorganization of the company which will provide for an adjustment of its difficulties without a foreclosure.

Atlantic & Pacific Telegraph.

In Cincinnati, June 20, the District Court decided to grant an injunction against the use by the Atlantic & Pacific and Baltimore & Ohio companies of a wire recently erected on the line of the Marietta & Cincinnati Railroad between Cincinnati and Parkersburg. The suit was brought under a contract made by certain parties known as the Marietta & Cincinnati Telegraph Company with the Marietta & Cincinnati Railroad Company in 1857, the Western Union claiming to be the legitimate successors of the Marietta & Cincinnati Telegraph Company and the owners of all rights and privileges under that contract, among which was the exclusive right to use the poles for wires for through business. This decision deprives the Atlantic & Pacific of the use of a wire between Cincinnati and Baltimore.

Freehold & Keyport.

The work on this road is now so well advanced that the company expects to have trains running next month from Freehold, N. J., north to Matawan on the New Jersey Central's Long Branch Division. The distance is about 12 miles, through a fine farming country.

Baltimore & Ohio.

In the inquest on the body of H. E. Dixon, killed in the late collision at Point of Rocks, the jury could not agree as to the cause of the collision. It is said that two held the conductor and engineman of the excursion train responsible, while ten favored a verdict of censure on the officers of the road for failing to give more specific instructions as to the running of the excursion train. None of them attributed any blame to those in charge of the regular train.

On June 20 about 100 men were discharged from the Mount Clare shops in Baltimore and a number at other shops on the line. It is said that a further reduction will be made soon.

The Baltimore *Gazette* of June 26 says: "We hear to-day, from what we regard as good authority, that the Baltimore & Ohio Railroad Company have concluded a negotiation, which has been some time in progress at London, for a loan of $5,000,000, the object of which is to take up the floating debt of the company incurred in the building of the Chicago Branch; and it is further stated that a million dollars of this loan is to be paid over to the company during the current week."

An attack was made on the stock of the company on the Baltimore exchange last week and it was forced down to 80⅛ on one day, but soon rallied and is now at from 100¼ to 101. The amounts sold at the lower prices were very small.

Michigan Central.

The annual election, held June 25, resulted in the re-election of the old management, only two changes being made in the board. No opposition was made at the meeting. With regard to the attempt to oust the management a Detroit dispatch says:

"It is understood here that the net result of the lively contest over the proxies was substantially this: The Moses Taylor interest succeeded in obtaining control of 80,000 shares; the Vanderbilt and Russell Sage interest of about 30,000, and the Gould and Hatch interest of about 45,000. The New-Hampshire shareholders offered 11,000 shares to Mr. Taylor, if John N. Barron, of Concord, should be put on the board, and the Western shareholders, under Mr. Joy's lead, also supported the old board, the victory being thus clearly with the friends of the present management. Mr. Vanderbilt last week placed his proxies in Mr. Taylor's hand and gave up the contest. Somewhat later Mr. Gould took the same course, and the entire opposition thus drew out of the field before the day of the election."

The stockholders voted at the meeting to change the company's fiscal year so as to end Dec. 31, instead of May 31, as heretofore.

The report as read showed a decrease in funded debt of $151,000. The total earnings in round figures were $6,483,000; expenses, $4,439,000; taxes, $267,000; net earnings, $1,777,000. The floating debt has been reduced to $250,000, of which about $150,000 has been paid since the close of the fiscal year. The tonnage of the road has largely increased, the number of tons moved one mile showing an increase of 78,872,000 tons. With the rates of the year ending June 1, 1876, and the tonnage of the last year, the net earnings would show an increase of $1,160,000, or sufficient to have paid a dividend of 6 per cent. on the capital stock. Eighty-three miles of steel rail have been laid on the main and air lines, leaving but five miles of iron on the main line and 30 on the air line to be replaced.

Cincinnati Southern.

The trustees last week awarded a number of small contracts for station buildings, and for engine houses and other buildings at Somerset and Lexington.

The directors of the common carrier company on June 22 published a circular of which the following extract contains the essential part:

"The parties controlling a majority of the capital stock of the company made their subscriptions with the expectation and intention of not only operating the unfinished road, but also of completing it under a lease to be made in the future, the latter being the chief consideration with them.

"The board of directors as now composed reflects their views.

"In considering the argument proposed by the Trustees and incidental to the discussions connected therewith, it became apparent that by reason of the existence of a mortgage on the entire line of road and all its earnings from Cincinnati to Chattanooga, there could be no basis for a credit on which to raise the amount required for its completion, and of course no tangible security for those who might subscribe their money for that purpose.

"In regard to the immediate subject presented by the Trustees, that of operating the unfinished line of road, there is this to be said: The agreement presented by the Trustees has been modified to some extent, and might be accepted by the board of directors but for the fact that there remains a doubt in the minds of some as to its legal binding effect on the Trustees or the city, whom they represent, and who, therefore, have withdrawn their promised support. Under these circumstances the board felt it a duty to afford to all subscribers to the stock of the company an opportunity to modify or withdraw their subscriptions, as they might elect, and at the same time invite the co-operation of others in promoting the city's welfare by becoming subscribers.

"It is believed that the original subscribers to the majority of the stock will co-operate with their fellow-citizens in the undertaking to operate the road under the existing organization."

After the publication of this a large number of subscriptions were withdrawn or reduced, so as to bring the amount subscribed on the books down to $167,000. The books are to be reopened and kept open until July 10, with a view of securing a capital of $250,000. With this amount the directors propose to secure simply a license from the Trustees to operate the finished part of the road, leaving the city to complete the line.

St. Paul & Pacific.

Our Amsterdam correspondent writes that the bondholders' committee has published a statement that the majority of the certificates have assented to the agreement, and that the new plan (recently published) will be carried out. Arrangements for building the Barnes-Breckenridge connection will be immediately made.

Chicago, Burlington & Quincy.

The Aurora *Beacon* says:

"The C. B. & Q. Company is still economizing, and though the Aurora shops are overloaded with work quite a number of mechanics were last week discharged, the wages of others still further reduced, and in every department the men on Monday morning commenced on nine hours' time. They now begin work at 8 o'clock a. m. and quit at 6 p. m., except on Saturdays when their labors will cease at 5 o'clock."

Eastern.

A suit is pending to determine what right creditors holding the ten-year notes of the company as collateral have to be secured under the new general mortgage.

Another suit has been brought by holders of Portsmouth, Great Falls & Conway bonds, endorsed by the Eastern Company, to settle their rights under the compromise with the creditors and whether they are entitled to be secured under the general mortgage.

The suits to terminate the lease of the Eastern Railroad of New Hampshire have been referred by the Court to George A. Ramsdell, of Nashua, N. H., as master and referee. There are two of these suits, one brought by stockholders of the Eastern of New Hampshire, the other by the Attorney General of that State.

Iron Mountain, Chester & Eastern.

The United States Circuit Court has made perpetual the injunction restraining Mr. Sams, who was appointed Receiver by the Illinois Circuit Court, from taking or attempting to take possession of the road.

Ohio & Mississippi.

The New York *Bulletin* of June 27 says: "It is learned authoritatively that Mr. King, the Receiver of the Ohio & Mississippi Railroad, has gone West in the hopes of obtaining further facilities to provide the $175,000 necessary to pay the first-mortgage coupons falling due on the 1st prox. As the order of the court now stands, the Receiver has only permission to borrow the above amount from the second mortgagees and stockholders, which is impracticable in the brief period intervening between now and the first of July. According to the same authority, the road has earned the money to pay off the interest, but the money so earned has been applied to the payment of their indebtedness by direction of court."

Quincy, Missouri & Pacific.

The Illinois Supreme Court has reversed the decision of the Circuit Court and dissolved the injunction granted to restrain the City of Quincy, Ill., from issuing the $250,000 still due on the city subscription of $500,000 in aid of this road. The company will, it is stated, demand the immediate issue and delivery of the bonds, all the conditions having been complied with.

Fond du Lac, Amboy & Peoria.

Track is being laid on this road from Fond du Lac, Wis., southward, and the contractors promise to have the 50 miles to Oconomowoc done this year.

Cheraw & Chester.

The grading for this road is now very nearly completed and tracklaying will be begun at Chester, S. C., very soon. An engine has been bought and was delivered at Chester last week.

Denver & Rio Grande.

The Auditor's report for April is as follows:

Freight earnings	$31,873 54
Passenger earnings	17,362 23
Miscellaneous	87 40
Total ($183 per mile)	$49,323 17
Expenses (55.47 per cent.)	27,359 18
Net earnings ($82 per mile)	$21,963 99

Of the gross earnings $1,240 were from mails and $1,402.74 from other Government business.

Central Branch, Union Pacific.

It is proposed to build an extension from Greenleaf, Kan., 107 miles west of Atchison, through the Valley of the Republican River to Concordia, a distance of 47 miles. The company offers to build the road if a county subscription of $70,000 can be secured, and it is thought that the offer will be accepted.

Tyler Tap.

This company has executed a mortgage on its property to secure an issue of $360,000 twenty-year 7 per cent. bonds. The mortgage does not cover the land grant. With the proceeds of the bonds the company expects to complete the road.

Chicago, Pekin & Southwestern.

The Grundy County (Ill.) Circuit Court last week granted an application made by the United States Rolling Stock Company, to which the company is indebted for rent of locomotives, for a receiver, and appointed F. E Hinckley, President of the company, to that position. The road extends from Mazon, Ill., to Pekin, 88 miles; 28 miles, from Mazon to Streator, were built in 1875, the rest in 1873. It owns about 82 miles of road, six miles, from Streator to Pekin Junction, being leased from the Toledo, Peoria & Warsaw. It has, we believe, always paid the interest on its bonds.

Wallkill Valley.

It is stated that the purchasers of this road at the recent foreclosure sale intend to change the gauge at once from 6 ft. to 4 ft. 8½ in. The change will probably be made in July, and will be made by laying a third rail over one-half the road, and then taking up the old outer rails and changing the gauge of the rest of the line. The third rail on one-half of the road will supply about the amount of iron needed to put the road in good condition, and will decrease the work which must be done in a day. The company has little or no equipment, as the Erie has heretofore supplied that in use on the road. The

object of changing the gauge at present is not apparent, as the road has no rail outlet except over the Erie.

Quincy and Beardstown.

The Quincy (Ill.) *Whig* says: "The engineers surveying the Quincy & Beardstown Railroad have reached Beardstown. The distance by the new line from Mt. Sterling to Beardstown is 20⅞ miles—by the old survey 25 miles. The new line is of better grade, and, save one mile, will be easier worked. About one mile will be of 40 feet per mile—the other 19 miles from 20 to 30 feet per mile. The old line for 8¾ miles ran in the low bottoms of the Illinois River, requiring heavy embankments to keep above high water. The new line has less than two miles in the said bottom."

Sabine Pass & Northwestern.

Ground was broken on this road at Lawrence, Tex., June 8, with due ceremony. The company expects to complete the section from Lawrence to Kaufman this season. The road is to be of 3 ft. gauge, and is to run from Sherman, Tex., through Lawrence, Kaufman, Athens, Jacksonville and Beaumont to Sabine Pass, about 330 miles.

Quincy, Payson & Southeastern.

A contract for the construction of this road has been let to E. Pratt Buell & Co., of Quincy, Ill. The survey of the line is to be begun at once. The projected line is from Quincy across Illinois to the Wabash River, about 280 miles, passing through Payson, Pittsfield and Effingham.

Cumberland Mountain.

A company by this name is being organized to build a railroad from Lexington, in Overton County, Tenn., eastward through Fentress, Scott and Campbell counties to the Cincinnati Southern, about 70 miles.

Cincinnati & Portsmouth.

At a recent meeting of the board the Chief Engineer reported that work on the 40 miles from Cincinnati to Georgetown was progressing well. The road-bed is ready for the iron as far as Bethel, 28 miles from Cincinnati, and the bridge over the Miami River is nearly finished. If there is no delay in procuring the iron the road can be opened to Georgetown in the fall.

Lake Superior & Mississippi.

On June 14 this road was formally transferred to the Purchasing Committee, who bought it for account of the bondholders at the recent sale. The committee has appointed John P. Ilsley, President of the old company, its agent to manage the road. All employes are continued in position. Until further notice all accounts will be kept and business done under the name of "The Purchasers of the Lake Superior & Mississippi Railroad."

Indianapolis & Springfield.

Track is reported down on this road from Rockville, Ind., the crossing of the Logansport, Crawfordsville & Southwestern, west to Coloma, four miles. The contractors expect to complete about 15 miles this year.

Toledo, Ann Arbor & Northern.

It is reported that this unfinished road has been sold to some Boston parties, who propose to complete it if a reasonable amount can be raised along the line. Efforts are now being made to secure subscriptions at Ann Arbor and other points.

Illinois Midland.

The shops at Paris, Ill., were burned on the night of June 14 with the tools and machinery, and two locomotives were badly damaged. The buildings were all of wood and not valuable. The loss is estimated at $15,000.

Memphis & Charleston.

This company offers to its security-holders $700,000 new 7 per cent. bonds at 75. The object of the new loan is to take up the lien of the State of Tennessee on the road. This lien amounts to $1,700,000, but it is payable in State bonds and $625,000 in cash will, with the assets on hand, be sufficient for the purpose. When the State lien is paid the new bonds will be a first lien upon the road in Tennessee. It is stated that President Wilson and Vice-President McGhee have agreed to take one half the loan, if the rest is taken by July 1.

Colorado Central.

Work is in progress on the extension from Black Hawk to Central City, Col. The length of the extension is 3½ miles, in which an elevation of 508 feet is to be overcome. The highest grade will be 174 feet to the mile; the sharpest curve, 30 degrees.

The extension of the Floyd Hill Branch to Georgetown is now completed for eight miles west of Floyd Hill to a point one mile beyond Idaho Springs, and trains are running. Six of the remaining nine miles are graded and the company expects to run trains to Georgetown by the end of July. This division of the road is of 3 ft. gauge.

A survey has been made for an extension of the standard-gauge line from its present terminus at Longmont, Col., northward to Cheyenne, Wy. Ter., about 65 miles.

New Jersey Midland.

The Receivers' report of the earnings for May and for the five months ending May 31 is as follows:

	May.	Five months.
Passengers	$9,213 63	$47,275 53
Freight	20,522 79	96,785 58
Milk	19,400 00	71,244 86
Miscellaneous	7,328 77	34,806 62
Total	$56,465 19	$250,112 59
Working and terminal expenses	40,340 39	192,568 94
Net earnings	$16,124 80	$57,543 65
Per cent. of expenses	71.44	76.99

The earnings and expenses as given are the actual cash receipts and payments. The Receivers' cash account is as follows:

Balance, May 1	$126 10
Road account	56,465 19
Loan account	15,567 12
Total	$72,158 41
Working and terminal expenses	$40,340 39
Right of way	263 00
Construction account	3,453 00
Equipment account	3,010 52
Middletown, Unionville & Water Gap lease	6,000 00
Discount and interest	618 42
Loan account	16,062 38
	69,747 71
Balance, June 1	$2,410 70

As compared with 1876, the gross earnings show for May an increase of $4,392.20, or 8.4 per cent.; for the five months, an increase of $20,228.41, or 8.8 per cent. The milk business is unusually good this year.

Buffalo, New York & Erie.

This company will receive at its office, No. 9 Nassau street, New York, or at the office of Latham, Alexander & Co., New York, until June 30, bids for $1,922,000 new 7 per cent. mortgage bonds. These bonds have 70 years to run and are the remainder of an issue of $2,380,000, of which $458,000 have already been issued in exchange for old bonds cancelled. The bonds now to be sold are for the purpose of paying off an equal amount of old bonds which will become due Dec. 1, 1877, and will, on the payment of those bonds, be the only mortgage lien on the property. The road is leased to the Erie, forming the Buffalo Division of its main line. No bid less than par and accrued interest will be received; the old bonds will be received in payment of bids at par and interest.

Holly Springs, Brownsville & Ohio.

This company is reported to be laying track on its road from Brownsville, Tenn., northward, and to be grading from Brownsville south.

Portland & Ogdensburg.

It was expected that this company would apply to the New Hampshire Legislature for authority to change the location of the road from Fabyan, N. H., to Dalton, and much opposition was expected. It is now stated that an agreement has been made by which trains will continue to use the Boston, Concord & Montreal track from Fabyan to Dalton, and nothing further will be done in the way of changing the location, or of building on the old location between those points. The embarrassed condition of the company has probably had a good deal to do with this decision.

Chicago, Rock Island & Pacific.

At a meeting of the board in New York, June 22, the question of canceling the 40,000 shares of stock now in the treasury was referred to counsel for report and advice. The board decided to declare the usual quarterly dividend of 2 per cent.

St. Louis, Keokuk & Northwestern.

The suit of this company to condemn certain portions of the right of way of the Hannibal Bridge Company in Hannibal, Mo., upon which its track is laid, has been transferred to the United States Circuit Court. The Missouri Court, which granted the transfer, also decided that the injunction lately sued out to restrain the Wabash Railway Company from interfering with the track in question does not apply to the Hannibal Bridge Company. That company thereupon gave notice that the track in question must be removed by July 1, and that the use of the bridge track by the St. Louis, Keokuk & Northwestern trains must cease at the same time. This will cut off the connection between the road south of Hannibal and the section from Hannibal to Keokuk.

Wabash.

The Purchasing Committee has published the following circular to stockholders:

"The foreclosure suits recently brought by a few of the holders of first-mortgage bonds on the Wabash Railway have been amicably adjusted and withdrawn, and the coupons of the bonds represented are under this arrangement to be funded.

"While the business of the road has, like all railways in the country, suffered from the general stagnation, the decrease in the volume of traffic has been less than in that of most of the Western roads, and meantime extensive economies have been introduced in the working expenses of the line by reducing the number of employes, amount of salaries, wages, etc. Mr. A. L. Hopkins, the new Manager, under whose direction these changes have been commenced, expresses great confidence in the future prosperity of the road. The area of crop planted is much larger this year than usual, and the prospects are favorable for a more abundant harvest than has been secured at the West for several years. Measures have also been introduced to obtain for the Wabash road its legitimate share of business as a part of the trunk line system."

Coney Island & Surf.

A survey is being made for a narrow-gauge railroad to run from Coney Island, N. Y., to Sheepshead Bay, on Long Island, a well-known summer resort. The distance is about 3¼ miles.

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Nashua & Lowell.

This company owns a line from Nashua, N. H., to Lowell, Mass., 14.5 miles, all double track; it leases the Stony Brook Railroad, from Chelmsford, Mass., to Ayer Junction, 15.5 miles; the Wilton Railroad, from Nashua to Wilton, 13 miles, and the Peterborough Railroad, from Wilton to Greenfield, 10.5 miles, making 53.5 miles in all. It is worked under a contract with the Boston & Lowell, by which the two roads and their branches are worked as one line, the Boston & Lowell receiving 69 and the Nashua & Lowell 31 per cent. of the earnings. This contract will expire Oct. 1, 1878. The forty-second annual report covers the year ending March 31, 1877.

The credit side of the general balance sheet is as follows:

Stock ($35,172 per mile)	$800,000 00
Gold bonds ($13,793 per mile)	200,000 00
Notes payable ($17,241 per mile)	250,000 00
Cashier joint roads, on account	12,715 34
Unclaimed dividends	1,039 00
Dividend No. 74	16,000 00
Contingent fund	72,954 98
Total ($93,290 per mile)	$1,352,709 32

The company holds $25,000 Ogdensburg & Lake Champlain bonds, $93,500 notes receivable and cash and other assets, outside of road, equipment and materials, amount to $72,014.93. Deducting these, the total liabilities are $1,162,194.32, or $80,151 per mile owned.

The earnings for the year were:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passenger account	$227,100 73	$242,104 93	Dec. $15,004 20	6.2
Freight account	265,307 53	248,238 81	Inc. 17,068 72	6.9
Mail and express	14,636 87	13,915 89	Inc. 720 98	5.2
Total	$507,045 13	$504,259 63	Inc. $2,785 50	0.6
Expenses	361,726 49	395,056 49	Dec. 33,330 00	8.4
Net earnings	$145,318 64	$109,203 14	Inc. $36,115 50	33.1
Gross earn. p'r mile	9,477 48	9,425 41	Inc. 52 07	0.6
Net " "	2,716 24	2,041 18	Inc. 675 06	33.1
Per ct. of expenses	71.34	78.34	Dec. 7.00	8.9

The net result of the year was:

Net earnings		$145,318 64
Rent account	$80,389 09	
Wilton R. R., rental	10,650 72	
Peterborough stage line	1,861 83	
Interest, funded debt	12,959 25	
" floating debt	4,268 97	
Dividends, 4 per cent	32,000 00	
		142,129 86
Net balance for year		$3,188 78
Balance from previous year		80,848 70
Total		$84,037 48
Proportion of settlement with Northern (N. H.) R. R., old claims		11,082 50
Balance, contingent fund		$72,954 98

All unusual expenditures have been avoided, but the property has been fully maintained and the work of renewing the track with steel continued. The dividends paid have been fairly earned. The business has shown an improvement and the earnings of the winter half of the year, generally much the smallest, were nearly equal to those of the summer half.

Reference is made to the approaching expiration of the contract with the Boston & Lowell and the necessity of considering the question of a renewal. Should the stockholders decide to renew it, the directors believe that several modifications will be needed to meet the changed circumstances of both companies and the increased traffic of the roads.

Columbus & Hocking Valley.

This company owns a line from Columbus, O., southeast to Athens, 76 miles, with a branch from Logan to New Straitsville, 13 miles, making 89 miles in all. It is a large carrier of coal from the Hocking Valley region and is now practically extended to Toledo by the recent completion of the Columbus & Toledo road, which has the same management and nearly the same ownership. The latest report is for the year ending Dec. 31, 1876.

The equipment consists of 31 engines; 8 passenger, 1 combination and 3 baggage cars; 100 box, 100 flat, 1,002 coal and 14 caboose cars. There are also on the road 886 coal cars owned by coal operators.

The general account is as follows:

Stock ($21,584 per mile)	$1,921,000 00
Bonds ($28,098 per mile)	2,500,000 00
Balances of accounts	58,147 33
Contingent account, undivided profits	380,736 15
Total ($54,605 per mile)	$4,859,883 48

The bonded debt was increased by $11,000 during the year. The annual interest charge is $175,000, or $1,966 per mile.

The work done was as follows:

	1876.	1875.	Inc. or Dec.	P. c.
Locomotive mileage	674,652	658,046	Inc. 16,606	2.5
Passenger car mileage	314,940	318,344	Dec. 3,404	1.1
Freight car mileage	8,384,261	8,065,464	Inc. 318,797	4.0
Passengers carried	129 767	146,871	Dec. 17,104	11.6
Passenger mileage	3,151,140			
Tons freight carried	842,824	826,498	Inc. 16,326	2.0
Tonnage mileage	47,572,017	45,853,513	Inc. 1,718,504	3.7
Av. receipt per pass. per mile	2.85 cts.			
Av. receipt per ton per mile	1.54 "	1.65 cts.	Dec. 0.11 ct.	6.7

The coal tonnage was: 1876, 782,316; 1875, 753,016; increase, 29,300 tons, or 3.9 per cent. Coal was 92 82 per cent. of the total tonnage in 1876, against 91.80 per cent. in 1875. The earnings for the year were:

	1876.	1875.	Inc. or Dec.	P. c.
Passengers	$89,867 01	$108,178 29	Dec. $18,311 28	16.9
Freight	733,364 44	756,482 03	Dec. 23,117 59	3.1
Mail, express, etc.	17,907 62	12,930 53	Inc. 4,977 09	38.6
Total	$841,139 07	$877,590 85	Dec. $36,451 78	4.2
Working expenses	454,304 83	519,214 77	Dec. 64,909 94	12.5
Net earnings	$386,834 24	$358,376 08	Inc. $28,458 16	7.9
Gross earn. per mile	9,451 00	9,860 57	Dec. 409 57	4.2
Net " " "	4,346 45	4,026 70	Inc. 319 75	7.9
Per cent. of exp's	54.01	59.28	Dec. 5.27	8.9

The income or contingent account for the year was as follows:

Net balance from 1875	$247,223 14
Net earnings for 1876	386,834 24
Total	$634,057 38
Interest on funded debt	$174,860 00
" " floating "	1,623 23
Dividends, 8 per cent	153,676 00
	330,159 23
Net balance to 1877	$303,898 15

President Greene's report says: "As a result of the policy adopted by the board some years since, to maintain the road in a condition to do its work at the least cost, the operating expenses were 54 per cent. of the gross earnings for the past year. The road, the equipment and motive power have been fully maintained. The round-house at south depot, containing thirty stalls, was completed during the year, and the cost charged to construction.

"A valuable improvement has been made in the road between the bridge over the Scioto River and the Columbus, Chicago & Indiana Central Railway, the grade having been raised to a level so as to pass the Dublin turnpike under the track, thus relieving us of a dangerous crossing, over which nearly all our tonnage passes.

"The net earnings of the road were sufficient to pay the amount required for the sinking fund, the regular dividends of 4 per cent. in August and February, and to carry a small balance to credit of contingent account. * * *

"I congratulate you upon the fact that the Columbus & Toledo Railroad has been completed and is now in operation. A contract for operating that road jointly with this has been made, and will be submitted to you at your annual meeting for approval.

"General Orland Smith has been appointed General Superintendent of this company, and of the Columbus & Toledo Railroad Company, and is now in charge of the operating department of both companies."

Cincinnati, Hamilton & Dayton.

This company works the following lines:

	Miles.
Cincinnati, Hamilton & Dayton, owned, Cincinnati to Dayton	60
Cincinnati, Hamilton & Indianapolis, leased, Hamilton, O., to Indianapolis, Ind.	98
Cincinnati, Richmond & Chicago, leased, Hamilton, O., to Richmond, Ind.	45
Dayton & Michigan, leased, Dayton to Toledo	142
Total	345

The Cincinnati, Hamilton & Indianapolis, formerly the Junction Railroad, was bought at foreclosure sale several years ago and has nominally a separate organization, but is really owned. The whole system forms a line 202 miles long from Cincinnati to Toledo, with branches to Richmond and Indianapolis. The thirtieth annual report covers the year ending March 31, 1877.

The equipment consists of 87 engines, 83 passenger train cars, 1,713 freight cars, 6 service and 149 hand cars.

The capital account at the close of the last two fiscal years was:

	1877.	1876.	Inc. or Dec.
Stock	$3,500,000 00	$3,500,000 00	
Bonds	3,091,000 00	2,950,000 00	Inc. $141,000 00
Bills payable	246,190 22	75,076 14	Inc. 171,114 08
Current accounts	440,052 67	387,071 13	Inc. 52,981 54
Surplus earnings	1,363,944 87	1,432,328 62	Dec. 68,383 75
Total	$8,641,187 76	$8,344,475 89	Inc. $296,711 87

The stock is $58,333 and the bonds $51,517 per mile. The company owns $700,000, par value, Cincinnati, Hamilton & Indianapolis bonds; $375,100 stock and $91,000 bonds of the Cincinnati, Richmond & Chicago; $1,390,100 Dayton & Michigan stock and $70,650 other stocks and bonds, the inventoried value of the whole being $967,121.18. It has claims for advances of $977,033.22 to the Cincinnati, Hamilton & Indianapolis, $518,816.71 to the Dayton & Michigan, $4,206.39 to the Cincinnati, Richmond & Chicago, and $119,514.21 to the Cincinnati, Richmond & Fort Wayne. Deducting these claims and securities, and the cash assets and balances due, the liabilities are $5,590,445.30, or $93,176 per mile.

The report says: "Our first mortgage bonds have been reduced $4,000 and the second mortgage $6,000 by the purchase of same for sinking fund of the consolidated mortgage, and the bonds have been canceled. Our third mortgage bonds, of which there were $500,000, fall due June 1, 1877. A fund was provided some time since by the sale of consolidated mortgage bonds for a portion of the amount, and $149,000 have been redeemed and canceled. There is a balance in this fund of $127,879.90, leaving $223,120.10 to be provided for, in addition to the

accumulated interest. The amount of floating debt is $246,190.22, against $75,076.14 last year, increase $171,114.08.

"There has also been advanced to the Cincinnati, Richmond & Fort Wayne Railroad Company, on account of our interest guarantee, the sum of $25,752.42, which, with $6 202.22 interest on amounts advanced to Dec. 1, 1876, makes the balance against that company $119,514.21."

There was expended during the year on construction, improvement and real estate accounts, for the Cincinnati, Hamilton & Dayton, $41,491.94; Dayton & Michigan, $11,426.46; Cincinnati, Hamilton & Indianapolis, $27,914.87. The last named company's account was credited with $654,000 bonds unsold. No payments were made on account of Dayton & Michigan sinking fund, the trustee holding that the canceling of bonds exchanged for preferred stock fulfilled the terms of the mortgage.

The work done was as follows:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passenger train mileage....	942,543	955,413	Dec. 12,870	1.3
Freight train mileage.....	754,128	835,044	Dec. 80,916	9.7
Total.....	1,696,671	1,790,457	Dec. 93,786	5.2
Passengers carried.....	1,426,083	1,542,823	Dec. 116,740	7.6
Passenger mileage.....33,379,599		35,590,791	Dec 2,211.192	6.2
Tons fre'ght carried.....	1,039,371	1,189,011	Dec. 149,740	12.6
Tonnage mileage 93,351,547		106,348,957	Dec.12,997,410	12.2
Av. pass. train load, No..	35.41	37.25	Dec. 1.84	4.9
Av. freight train load,tons.	123.79	127.36	Dec. 3.57	2.8
Earn. per pass tra n mile.	$0.951	.....	.....	....
Earnings per freight train mile.....	1.90	.....	.....	....
Earn. per pass. per mile..	2.47 cts.	.....	.....	....
Earn. per ton per mile...	1.539 cts.	.....	.....	....

Excluding the Atlantic & Great Western business the average per ton per mile was 1.592 cts. The report says: "A comparison of the rates per mile of passengers and freight can not be made with the previous year, for the reason that we received as compensation for the Atlantic & Great Western and Erie business the gross sum of $800 per day most of that year.

"The average rate received per ton per mile the past year for Atlantic & Great Western and Erie business was 1.02 cents, and low as this rate may appear by itself, it is only 0.3 of a cent less than the average of the whole business of the New York Central & Hudson River Railroad, while, in connection with our other business, it made an average rate of 0.489 cent more than that road, as per their last report: 0.339 cent more than the average of twenty-five roads in Michigan in 1875, and 0.279 cent more than the average of all roads in Ohio, as per Commissioners' report for the year ending June 30, 1875, and only 1-40th of a cent less than the same in 1873, when rates were much higher than now.

"The rates for transportation of freight which have been on a steady decline, it is hoped, have now reached their lowest point, ranging on the Cincinnati, Hamilton & Dayton Railroad from 3 cents per ton per mile for the year ending March 31, 1868, to 1.852 cents the past year, a decrease of .38 per cent.; on the Dayton & Michigan Railroad from 2.304 cents to 1.423 cents, decrease of 38 per cent.; Cincinnati, Richmond & Chicago Railroad from 3.500 cents to 2.243 cents, decrease of 36 per cent. For the Cincinnati, Hamilton & Indianapolis Railroad, we cannot go back further than the year ending March 31, 1874, four years. Comparing the past year with that, the rates on the Cincinnati, Hamilton & Dayton decreased 29 per cent.; Dayton & Michigan, 36 per cent.; Cincinnati, Richmond & Chicago, 4 per cent., and Cincinnati, Hamilton & Indianapolis, 11.5 per cent. Comparing the last year with the year previous, the rates on the Cincinnati, Hamilton & Dayton decreased 8.5 per cent.; Dayton & Michigan, 6.2 per cent.; Cincinnati, Hamilton & Indianapolis, 5.5 per cent.; with an increase on the Cincinnati, Richmond & Chicago of 3 per cent. In making these comparisons, the Atlantic & Great Western and Erie freight is not included, for the reasons before stated."

The earnings for the year were:

	1876-77.	1875-76.	Inc. or Dec.	P. c.
Passengers.....	$786,130 09	$869,746 98	Dec.. $83,616 89	9.60
Freight.....	1,349,855 20	1,576,007 92	Dec.. 226,152 72	14.35
Mails.....	36,497 96	41,802 62	Dec.. 5,304 66	12.69
Express.....	40,316 35	42,267 88	Dec.. 1,951 53	4.60
Miscellaneous...	95,945 74	112,444 40	Dec.. 16,498 66	14.60
A. & G. W. & Erie business..	123,128 84	255,322 73	Dec.. 132,193 89	51.78
Total.....	$2,431,874 18	$2,897,592 53	Dec..$465,718 35	15.96
Expenses.....	1,751,476 30	$1,987,925 70	Dec..$236,449 40	11.99
Taxes.....	122,335 76	116,486 52	Inc.. 5,849 24	5.00
Total.....	$1,873,812 06	$2,104,412 22	Dec..$230,600 16	10.96
Net earnings....	$558,062 12	$793,180 31	Dec..$235,118 19	29.64
Gross earn. per mile.....	7,048 91	8,398 82	Dec.. 1,349 91	15.96
Net. earn. per mile.....	1,617.57	2,299 07	Dec.. 681.50	29.64
Per cent. expenses.....	72.02	68.60	Inc .. 3.42	5.00
Per cent. exps. and taxes....	77.05	72.63	Inc .. 4.42	6.09

The net result of the year was as follows:

Net earnings.....		$558,062 12
Interest.....	$607,445 53	
Dayton & Michigan rental dividends.....	137,794 37	
		745,239 90
Net loss.....		$187,177 78

This result was apportioned among the several lines as follows:

	Gross earn.	Exps., taxes and interest.	Gain or Loss.	Earn. per mile.
Cin., Ham. & Dayton.....	$946,921 15	$868,711 80	Gain $78,209 35	$15,782
Cin., Ham. & Indianapolis.	398,521 67	593,069 65	Loss 199,547 98	4,016
Cin.,Richmond & Chicago...	185,745 88	181,683 87	Gain 4,062 01	4,128
Dayton & Michigan.....	905,685 48	975,586 64	Loss 69,901 16	6,378
Total.....	$2,431,874 18	$2,619,051 96	Loss.$187,177 78	$7,849

The decrease in passenger earnings resulted mainly from diversion of travel owing to the Centennial. The pleasure travel to the lakes was small and the large excursion travel to the Cincinnati Exposition was entirely missing, owing to the discontinuance of the exposition. The freight decrease was due to diversion of traffic by very low rates eastward, to short crops and to falling off in lumber and ice freights. The decrease in grain, lumber and ice was 7,375 car-loads.

The contract for joint working arrangements and division of business between Cincinnati and Dayton with the Cleveland, Columbus, Cincinnati & Indianapolis road was in operation seven months of the year and worked very well.

But one accident of any importance occurred during the year.

Crop prospects along the line are very good and a better business is looked for this year. It can be carried with very small increase ot expenses.

Renewals during the year included 1,086 tons steel and 3,689 tons rerolled iron rails and 138,209 ties. There are now 50½ miles of main track laid with steel. Two new engines were bought and several old ones changed to burn coal. There are now 66 coal burners on the line, and a considerable saving has resulted from the use of coal. Several new cars were built in place of old ones condemned.

The third or 6 ft. gauge rail between Dayton and Cincinnati has been taken up. Some of the rails have been sold; the rest will be used for sidings or rerolled. The rails, spikes, etc., taken up were credited to construction account at present value, leaving $133,325.98 as the remnant of an investment of over one million dollars.

RAILROAD LAW.

Town Bonds in New York.

A law passed by the late Legislature of New York requires the commissioners of all towns which have issued railroad aid bonds, to make annually to the Board of Supervisors of the county a report showing the amount of bonds issued, the rate of interest, time of maturity and the amount of principal and interest due for the ensuing year. The Board of Supervisors must thereupon assess upon the town a tax equal in amount to the payments required. The money raised shall be paid to the town commissioners, who shall pay the bonds and coupons as they become due, cancel them and deliver them to the town or city auditor. They shall also keep a record of all proceedings, which shall be kept open to inspection at all times. The provisions of this act shall not apply to the counties of Oswego, Madison, Erie, Orleans, Niagara and Genesee.

Another act relating to town bonds is as follows:

Section 1. Whenever the bonds of any city, village, town or county shall have been issued and sold by the proper authorities, and the time fixed for the maturity of such bonds, or any of them, shall be for a longer period than that provided by the law under which they were issued, a variance not exceeding sixty days shall not be regarded or held as affecting the validity of such bonds.

Sec. 2. Nothing in this act contained shall affect any litigation now pending.

Sec. 3. None of the provisions of this act shall apply to the counties of Orleans and Niagara.

The Granger Cases.

A Washington dispatch gives the following as the decision of the United States Supreme Court in another of the Granger cases, that of the Chicago, Burlington & Quincy against the Iowa law. The title of the case is: The Chicago, Burlington & Quincy Company against M. E. Cutts, Attorney General, *et al* Appeal from the Circuit Court of the United States for the District of Iowa:

"Railroad companies are carriers for hire. They are incorporated as such and given extraordinary powers in order that they may the better serve the public in that capacity. They are, therefore, engaged in a public employment affecting the public interest, and, under the decision of Munn & Scott vs. The People, just announced, subject to legislative control as to their rates of fare and freight, unless protected by their charters. The Burlington & Missouri River Railroad Company, the benefit of whose charter the Chicago, Burlington & Quincy Railroad Company now claims, was organized under the general corporation law of Iowa, with power to contract in reference to its business the same as private individuals, and to establish by-laws and make all rules and regulations deemed expedient in relation to its affairs, but being subject, nevertheless, at all times to such rules and regulations as the General Assembly of Iowa might, from time to time, enact and provide. This is, in substance, its charter, and to that extent it is protected as by a contract, for it is now too late to contend that the charter of a corporation is not a contract within the meaning of that clause in the Constitution of the United States which prohibits a State from passing any law impairing the obligation of a contract. Whatever is granted is secured subject only to the limitations and reservations in the charter or in the laws and Constitutions which govern it. This company, in the transaction of its business, has the same rights, and is subject to the same control as private individuals under the same circumstances. It must carry when called upon to do so, and can charge only a reasonable sum for the carriage. In the absence of any legislative regulation upon the subject, the courts must decide for it, as they do for private persons, when controversies arise, what is reasonable, but when the Legislature steps in and prescribes a maximum of charge, it operates upon this corporation the same as it does upon individuals engaged in a similar business. It was within the power of the company to call upon the Legislature to fix permanently this limit and make it a part of the charter, and if it was refused, to abstain from building the road and establishing the contemplated business. If that had been done the charter might have presented a contract against future legislative interference. But it was not, and the company invested its capital, relying upon the good faith of the people and the wisdom and impartiality of legislators for protection against wrong under the form of legislative regulation. It is a matter of no importance that the power of regulation under consideration was not exercised for more than 20 years after this company was organized. A power of Government which actually exists is not lost by non-use. A good Government never puts forth its extraordinary powers except under circumstances which require it. That Government is the best which, while performing all its duties, interferes the least with the lawful pursuits of its people. In 1691, during the third year of the reign of William and Mary, Parliament provided for the regulation of the rates of charges by common carriers. This statute remained in force, with some amendment, until 1827, when it was repealed, and it has never been re-enacted. No one supposes that the power to restore its provisions has been lost. A change of circumstances seemed to render such a regulation no longer necessary, and it was abandoned for the time. The power was not surrendered. That remains for future exercise when required. So here, the power of regulation existed from the beginning, but it was not exercised until, in the judgment of the body politic, the condition of things was such as to render it necessary for the common good. It is held that it does not affect the case that before the power was exercised the road had been leased, and its income pledged to the payment of its debts; and that, as the road was wholly within the State, the latter had full power in the absence of legislation by Congress. It is also held that the statute is not in conflict with the Constitution of the State concerning the privileges of citizens. Affirmed. The Chief Justice delivered the opinion."

The Protection of Cars against Lightning.

The following is from Spang's "Practical Treatise on Lightning Protection," a work recently published by Claxton, Remsen & Haffelfinger, of Philadelphia:

A locomotive, with its escaping smoke and steam, moving or at rest, in a thunder storm, will also invite a lightning discharge, and the liability of damage thereto depends upon the quantity of water that has fallen previous to the discharge, the electrical connection made by the rails with the road-bed, the conducting nature of the road-bed and the earth beneath it, also whether iron cars are in the train. During the evening of Sept. 2, 1844, severe thunder-storms prevailed, after a long spell of dry weather, in the eastern part of the State of Pennsylvania, accompanied with heavy lightning discharges, which destroyed and damaged a number of buildings, barns, etc. The locomotive Richmond, drawing a train of empty coal cars over the Philadelphia & Reading Railroad, exploded while passing through one of these storms, which prevailed about a mile and a half north of the borough (now city) of Reading, killing the engineer, conductor and two firemen. It was generally supposed, and it is quite likely, that the primary or principal cause of the explosion was a very heavy lightning discharge which took place in the immediate vicinity of the locomotive at the time of the explosion. The road-bed at the place where the explosion took place consists of broken stone, which, no doubt, to a considerable extent, insulated the rails and locomotive from the earth beneath, thereby causing the discharge to generate a sudden and increased steam pressure in the boiler, and exploding it at its weakest points. Upon examination of the boiler after the explosion, it is claimed that the cast-iron stays across the crown of the fire-box was found to have been rather light, and part of the iron in the top portion of the boiler was thinner than in other portions thereof. The said weak points may be regarded as secondary causes of the explosion.

When a number of iron cars, like those used in the transportation of petroleum, are in a railway train, a lightning discharge will be diffused over them and greatly weakened, and thereby lessen the liability of damage to, or ignition of, the contents thereof. But in the case of a wooden car, the discharge will invariably pass through its interior and over inmates or contents in order to reach the earth, the contents being generally a path of much better conductivity than the wooden body of the car. The liability of injury or death of passengers and live-stock and the ignition of powder or other combustible material by lightning, can be greatly lessened by providing two metallic paths (one near each end) between the metal roof and the pedestals, axles, and wheels of each wooden car used for their transportation. This can be done at a small expense by apply ng flat iron bars, two inches wide and one-eighth of an inch thick, or four inches wide and one-sixteenth of an inch thick, along one of the sides and bottom of the body of the car, and connecting them with the metal roof and centre plates attached to the body, and also metallically connecting the centre plates of the trucks with the nearest or most convenient metal rod or bar communicating with the pedestals, thereby forming continuous metallic paths from the metal roof to the centre plates, thence to the pedestals, axles, wheels, and rails to the earth. During the summer season the rails of a railway track do not constitute very good earth terminals for lightning conductor, owing to the dry condition and poor conductivity of the road-bed, which generally consists of broken stone or furnace cinder, a foot or more in depth, and their capacity for diffusing a lighting discharge will depend principally upon the quantity of rain that has fallen previous to the discharge and the conductivity of the road-bed and the earth beneath.

Purchasing Agents' Association.

The annual convention met in Cleveland, O., June 19. It was called to order by President Sterling, when the following members answered to their names: James T. Sterling, Wabash; A. C. Armstrong, Lake Shore & Michigan Southern; A. G. Thompson, St. Louis & Southeastern; E. W. Porter, Canada Southern; A. H. Campbell, Missouri River, Fort Scott & Gulf; W. S. Cuddy, St. Louis, Iron Mountain & Southern; A. V. Hartwell, Chicago, Alton & St. Louis; George Tozer, Indianapolis, Cincinnati & Lafayette; C. M. Higginson, Chicago, Burlington & Quincy; E. P. Miller, Indianapolis, Bloomington & Western; John S. Lorimer, Detroit & Milwaukee; A. D. Clark, Union Pacific; J. H. Carpenter, Chicago & Northwestern; H. A. Crawford, St. Louis, Salem & Little Rock; G. C. Breed, Louisville & Nashville; J. H. Holway, Atlantic & Great Western; W. F. Merrill, Toledo, Peoria & Warsaw. Mr. E. Vardy, Great Western of Canada, subsequently joined the convention.

President Sterling made a short address and the Secretary then read letters from members who represented nearly all the roads in the country, expressing their co-operative feeling for the work of the association, or their regrets for not being able to participate in the meeting.

The convention then proceeded to business and there was a long discussion on lubricating and illuminating oils. The discussion was directed toward fixing upon a method by which the qualities of oil might be determined in such manner as to enable purchasing agents to decide upon the inferiority or excellence of the article which they wanted for use on their respective roads, climate, condition of rolling stock, and other contingencies considered. The subject was very thoroughly considered.

After adjournment the members visited the Otis Iron Company's works and the Lake Shore shops. In the latter they inspected the oil-tester constructed by Mr. Withycombe, an engraving of which was published in the reports of the Master Mechanics' Convention. The members were then driven around the city in carriages.

The second day's proceedings opened with a discussion on cost and quality of bar and other iron for use in repair shops. A long discussion was had on waste and rags, the various qualities and their cost and the use of cotton waste as compared with other materials. The discussion afterwards touched several minor points.

After electing officers for the ensuing year it was resolved to hold the next meeting in New York, May 21, 1878. The usual resolutions of thanks were passed and the convention adjourned.

Former Presidents of the Michigan Southern.

The Toledo *Commercial* prints the following historical notes from Mr. C. P. Leland, Auditor of the Lake Shore & Michigan Southern:

"From 1840 to 1849 (August 1), the Erie & Kalamazoo and the Michigan Southern (Monroe to Hillsdale) were competing roads. On the day last referred to, the Michigan Southern acquired possession of the Erie & Kalamazoo by a perpetual lease. The Monroe management of the Southern saw the inevitable result of this combination, and resigned. George Bliss, of Massachusetts, who was already President of the Erie & Kalamazoo, was made President of both roads, Aug. 4, 1849.

"A list of Presidents of the 'Old Southern' may be of interest to Toledo, the eastern terminus of that road, for the 30 years, 1849-1869. They were as follows:

1. James J. Godfroy, Nov., 1846, to June, 1847.
2. T. B. Van Brunt, June, 1847, to Dec., 1848.
3. Charles Noble, Dec., 1848, to August, 1849.
4. George Bliss, August, 1849, to July, 1852.
5. John B. Jervis, July, 1852, to March, 1853.
6. R. B. Doxtater, April, 1853; to June, 1853.
7. John B. Jervis, June, 1853, to April, 1855.
8. John Wilkinson, April, 1855, to April, 1857.
9. E. C. Litchfield, May, 1857, to August, 1857.
10. J. H. Ransom, August, 1857, to Sept., 1857.
11. John B. Jervis, Oct., 1857, to April, 1858.
12. George Bliss, April, 1858, to April, 1860.
13. E. M. Gilbert, April, 1860, to June, 1863.
14. M. L. Sykes, Jr., April, 1864, to August, 1865.
15. E. B. Phillips, Oct., 1865, to June, 1869.*

"Of the twelve only four (Jervis, Litchfield, Sykes and Phillips) are living. Mr. Doxtater held the position but a few weeks when he died very suddenly at La Porte.

"The 30 years' history of this company may properly be divided into four periods or dynasties, as follows:

"1. 1840-1846—Road controlled and operated by the State of Michigan.

"2. 1846-1857—By the Litchfields.

"3. 1857-1860—By George Bliss and friends.

"4. 1860-1869—By Henry Keep and his successor, Le Grand Lockwood."

* The date of consolidation with the Lake Shore Railway.

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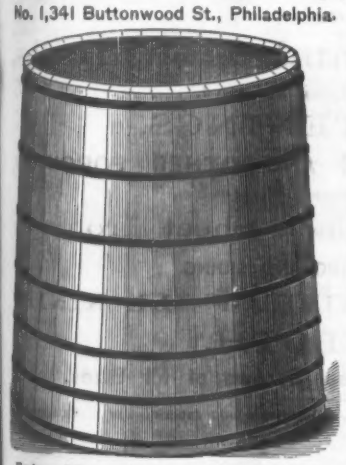

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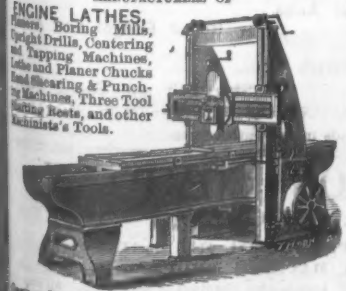

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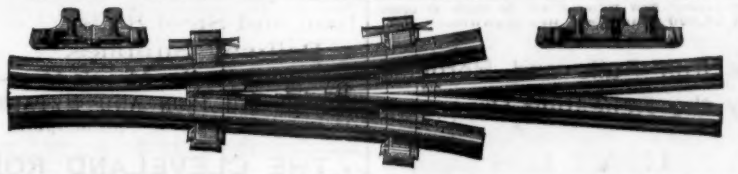

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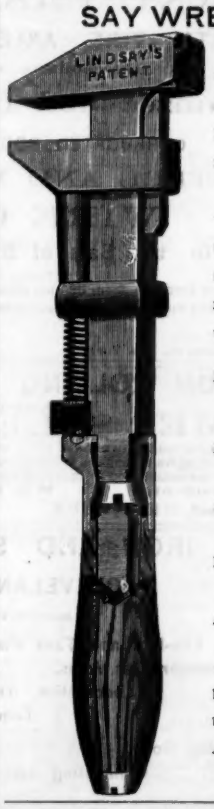

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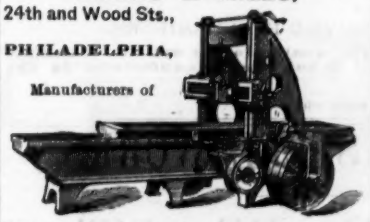

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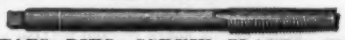

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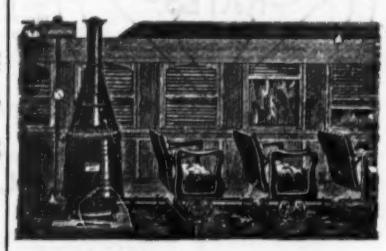

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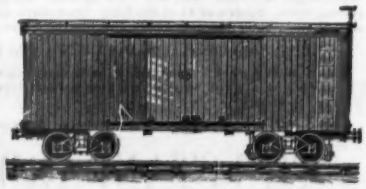

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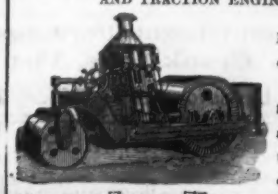

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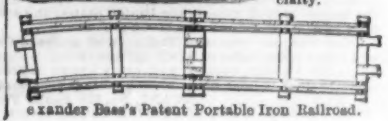

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